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PACIFIC SCIENCE

A QUARTERLY DEVOTED TO THE BIOLOGICAL AND PHYSICAL SCIENCES OF THE PACIFIC REGION

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[*Continued on inside back cover*]

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The Polychaetous Annelids of Alaska

OLGA HARTMAN[1]

INTRODUCTION

THIS PAPER is based on the polychaetous annelids obtained by the Alaska King Crab Investigation, which was sponsored by the United States Fisheries Commission. The annelids were taken almost entirely from southern and southwestern Alaska, from Port Ashton west to the western end of the Alaska Peninsula (Map I). In addition, some were obtained from scattered stations eastward to Icy Straits, near Pleasant Island, and to the north and west in the Bering Sea, north of St. Lawrence Island (Map II). The studies were conducted from September to November, 1940, and from February to August, 1941. Bathymetric ranges were largely limited to shallow depths, including shore to 60 fathoms, but three stations represented by polychaetes were in depths of 100 to 150 fathoms. A general report of the investigation has been published (Investigation Staff, 1942).

The intertidal areas of Alaska have heretofore been little explored for the annelid fauna. Except for the vast collections of the U.S.S. "Albatross" made by the Alaskan Salmon Commission during the summer of 1903 (of which much was dredged from deep water), the published records are quite limited, although they extend over many years (1821 to 1943).

The collections of the present investigation comprise 99 species, including six new to science. There are 45 new records for Alaska, including three species from material in the author's collection. These, together with 168 species (and seven questionable names) previously recorded, bring the total number for Alaska to 213 species plus the seven questionable names. These results are discussed in detail below.

The various stations are listed and the known ecological data of each are given at the end of the systematic treatment.

The bibliographic citations in the systematic section include the original description and such others as aid in the ready identification of the species. For most of the species originally described from the eastern Pacific the citations are complete unless they are synonymized elsewhere. In all cases it is possible to consult all references for Alaska and environs from the data given.

Acknowledgments: The collections on which the present work is based were obtained under the direction of Dr. Waldo L. Schmitt. The preliminary sorting of collections was performed by the staff of the Invertebrate Division of the United States National Museum, to whom thanks are extended. The two maps and figures 1, 8, and 12 were done by Mr. Anker Petersen. The author is deeply indebted to the administration of the Allan Hancock Foundation for allowing time and facilities to conduct these studies.

The specimens are deposited in the United States National Museum; a duplicate set is in the collections of the Allan Hancock Foundation, University of Southern California.

HISTORICAL RESUME

The literature on the polychaete fauna of Alaska is enriched largely through the results of expeditionary ventures that had other objectives. Chronologically considered, the data are as follows. The first annelids were described by

[1] Allan Hancock Foundation, University of Southern California. Manuscript received April 15, 1947.

Chamisso and Eysenhardt (1821) from collections made during a Russian voyage around the world. Two new species, *Nereis heteropoda* and *Sternaspis elegans*, were reported from Unalaska. Both remain indeterminable, although the first was redescribed by Grube (1855).

A later Russian expedition resulted in the description of three new species by Grube (1851), *Nereis vexillosa, Polynoë cirrata,* and *Cirratulus borealis,* from Sitka. The latter two have since been referred to *Harmothoë imbricata* (Linnaeus), and, questionably, *Cirratulus cirratus* (Müller), respectively. The same author (Grube, 1855) added two more to the list, *Polynoë vittata* and *Polynoë tuta,* which are now known as *Arctonoë vittata* (Grube) and *Hololepidella tuta* (Grube).

The International Polar Expedition to Point Barrow, Alaska, in 1885, resulted in the description of *Arenicola glacialis* Murdoch (1885*a*) and the addition of five other species (Murdoch, 1885*b*). These are *Melaenis loveni* Malmgren, *Phyllodoce groenlandica* Oersted (here called *Anaitides*), *Castalia multipapillata* Théel (here called *Psammate*), *Aricia arctica* Murdoch (questionably referred to *Scoloplos armiger* Müller), and *Brada granulata* Malmgren.

Johnson (1901), in reporting on the annelids from Puget Sound, Washington, named one, *Polynoë insignis* (Baird) (here called *Halosydna brevisetosa* Kinberg), from Kadiak Island, Alaska.

Moore (1902) described numerous species from northern Greenland. Four of these, *Gattyana senta* Moore (here called *Eunoë*), *Gattyana ciliata* Moore, *Lagisca multisetosa* Moore, and *Eunoë truncata* Moore (here called *Hermadion*), were later (Moore, 1905*a*: 525) said to have come from Icy Straits, Alaska, rather than from Greenland.

In 1899 the Harriman Alaska Expedition explored the waters about Alaska. Among the polychaetes, only the families Sabellidae and Serpulidae were investigated (Bush, 1904). As a result, 18 species were newly recorded from Alaska, and five others, whose identity cannot be established (see Hartman, 1942, for revision and summary), were reported.

The U.S.S. "Albatross," operated by the Alaskan Salmon Commission in the summer of 1903, explored the waters from Port Townsend, Washington, to Shelikof Strait, Alaska. The polychaetes were ably described by Moore (1905 to 1908). As a result, 97 species of annelids were reported from Alaska, 81 for the first time. However, five of these, *Brada pilosa* Moore, *Sternaspis fossor* Stimpson, *Pseudopotamilla anoculata* Moore, *Pseudopotamilla brevibranchiata* Moore, and *Pseudopotamilla reniformis* (Leuckart), are regarded as synonyms, and one other, *Nereis* (*Alitta*) *virens* Sars, includes two species.

McIntosh (1910) added one new record, *Lumbriconereis fragilis* (Müller) (here called *Lumbrineris*), from Alaska but the record is not clear. It appears in his monograph of British annelids.

Nine new records were added by Treadwell (1914) among a total of 24 species from Alaska. A re-examination of the material on which these records were based has shown the following misidentifications: *Nereis procera* Ehlers is *Nereis pelagica* Linnaeus, *Naineris longa* Moore is *Naineris dendritica* (Kinberg), *Cistenides hyperborea* Malmgren is *Cistenides brevicoma* (Johnson), *Eudistylia polymorpha* (Johnson) is *Eudistylia vancouveri* (Kinberg), and *Schizobranchia nobilis* Bush is *Schizobranchia dubia* Bush. The type collection of *Scolecolepis alaskensis* Treadwell from Shumagin Islands, Alaska, has been examined and the species is here newly referred to the genus *Nerine.*[2]

[2] The prostomium lacks anterior horns; it is prolonged forward as a snout. Branchiae are present from the second setigerous segment and continued through a long region but absent from a considerable posterior portion. They are fused for their entire length with the postsetal lamella. The posterior end is a flat, short lobe. The first segment is biramous and has slender pointed setae both above and below. Hooded hooks are present in both notopodia and neuropodia, together with a tuft of pointed setae, after about the fifty-ninth segment. The prostomium may lack eyes. These characters are those of *Nerine.*

A single species was recorded from Alaska by Ditlevsen (1917) as *Harmothoë aspera* Hansen, but this is questionably referred to *Lagisca multisetosa* Moore, and was earlier reported. The same year Essenberg (1917) described a new species, *Euphrosyne multibranchiata,* from Kodiak Island, Alaska.

Treadwell (1921) added *Nereis* (*Ceratonereis*) *alaskensis* as a new species, but it has been referred to *Ceratonereis paucidentata* (Moore) (Hartman, 1938*a*: 13). He listed 13 additional species in 1925 and 1926. Of these, five were new records. Subsequently (Treadwell, 1943) he added *Neosabellides alaskensis* Treadwell.

Other recent additions are three new species added to the list by Hartman (1938*b*) and 17 new records added by Berkeley (1942) in a report of 49 species from Alaska.

Between 1929 and 1934 the State Hydrological Institute of the Union of the Socialist Soviet Republics (Russia) made extensive faunal investigations in the northern part of the Japan Sea. The polychaetes that were collected, together with some others taken from this region, comprised a total of 272 species (Annenkova, 1937 and 1938, with summary in the latter). Among these, 61 species are identical with those known from Alaska. These are indicated in the systematic list below by the letter *J*. Annenkova stated (1938) (translation from the Russian) that about 40 per cent of the observed fauna of the northern Japan Sea are species native to the northern part of the Atlantic Ocean, and that only about 10 per cent are common to the Alaska-California fauna. She adds, however, that more intensive collecting is necessary before sound conclusions can be drawn. The list below indicates that nearly 30 per cent of the species are the same.

Annenkova (1938: 142–144) recognized 12 groups of species. These groups are: (1) Arctic-boreal species, numbering about 25; (2) Arctic species, about 22; (3) species common to the Arctic, Atlantic, and Bering Sea, about 18; (4) boreal species common to the north Atlantic, about 22; (5) subarctic species with interrupted distribution, about 8; (6) species common to Japan and the western Bering Sea, 6 named in a list; (7) Japan-Okhotsk species, 18 named in a list; (8) species common to California, Alaska, and the north Japan Sea, about 16; (9) subtropical Japanese species, 9 or 10; (10) Indo-Pacific species, 9; (11) endemic species, 17; and (12) cosmopolitan species, 13. In summary, Annenkova states that 36 per cent are warm-water species, 23 per cent are Arctic-boreal, 11 per cent are western Pacific, and 11 per cent are Arctic species.

For the present, six groups may be recognized from the Alaskan species, although it is likely that no actual barriers exist; rather, with more intensive studies, many species now having a restricted range will probably be found more widely dispersed geographically.

The nearest affinities indicated by the tabulation of this material are with the eastern north Pacific coast, which has nearly 40 per cent represented; with the north Atlantic, which has nearly 37 per cent; and with the north Japan Sea, which has nearly 30 per cent.

The six groups recognized here are designated *a* to *f* in the following list, in which the 220 species known from Alaska are systematically arranged by families. Of these 220 species 7 are doubtful. In the list the reference following the complete name indicates the first record for Alaska. The names without such citation are here recorded for the first time.

The bracketed letters *a* to *f* and *J* indicate:

a—Alaska only, including 35 species
b—Alaska and Arctic, including 4 species
c—Alaska and either British Columbia, Washington, or Oregon, including 38 species
d—Alaska to California, including 89 species
e—Alaska to California, and Japan or China, including 38 species
f—Alaska and north Atlantic, including 78 species
J—refers to the species occurring in Annenkova's (1938) list.

List of the Species of Polychaetes Known from Alaska

Family APHRODITIDAE, one species
Aphrodita japonica Marenzeller (Moore, 1908) [*e*]

Family POLYNOIDAE, 27 species
Antinoë macrolepida Moore (Moore, 1905) [*d*]
Antinoë sarsi Kinberg (Chamberlin, 1920) (as *Antinoella* by Annenkova) [*f, J*]
Arctonoë pulchra (Johnson) (Moore, 1908) [*d*]
Arctonoë vittata (Grube) (Grube, 1855) [*e, J*]
Enipo cirrata Treadwell (Treadwell, 1925) [*c*]
Eunoë barbata Moore (Treadwell, 1925) [*e*]
Eunoë depressa Moore (Moore, 1905) [*c, J*]
Eunoë nodosa (Sars) (Moore, 1910) [*f, J*]
Eunoë senta (Moore) (Moore, 1905) [*d*]
Evarnella triannulata (Moore) [*d*]
Gattyana amondseni (Malmgren) (Moore, 1908) [*f*]
Gattyana ciliata Moore (Moore, 1905) [*c, J*]
Gattyana cirrosa (Pallas) (Berkeley, 1942) [*f, J*]
Gattyana imbricata Treadwell (Treadwell, 1926) [*a*]
Gattyana iphionelloides (Johnson) [*c*]
Halosydna brevisetosa Kinberg (Johnson, 1901) [*d*]
Harmothoë hirsuta Johnson (Moore, 1908) [*d*]
Harmothoë imbricata (Linnaeus) (Grube, 1851) [*e, f, J*]
Hermadion truncata (Moore) (Moore, 1905) [*c*]
Hololepida magna Moore (Moore, 1905) [*c*]
Hololepidella tuta (Grube) (Grube, 1855) [*c, J*]
Lagisca lamellifera (Marenzeller) (Moore, 1910) [*d*] (= *L. multisetosa papillata* Moore (1908))
Lagisca multisetosa Moore (Moore, 1905) [*d*]
Lagisca rarispina (Sars) (Moore, 1908) [*f*]
Lepidonotus caeloris Moore (Moore, 1903) [*d*]
Lepidonotus robustus Moore (Moore, 1905) [*a*]
Melaenis loveni Malmgren (Murdoch, 1885) [*f*]

Family POLYODONTIDAE, one species
Peisidice aspera Johnson (Moore, 1908) [*d*]

Family SIGALIONIDAE, one species
Pholoë minuta Fabricius (Moore, 1908) [*f, J*]

Family CHRYSOPETALIDAE, one species
Paleanotus chrysolepis Schmarda [*d*]

Family EUPHROSINIDAE, five species
Euphrosine arctia Johnson (Moore, 1908) [*d*]
Euphrosine bicirrata Moore (Moore, 1905) [*d*]
Euphrosine heterobranchia Johnson (Treadwell, 1914) [*c*]
Euphrosine hortensis Moore (Moore, 1905) [*d, J*]
Euphrosine multibranchiata Essenberg (Essenberg, 1917) [*a, J*]

Family SPINTHERIDAE, one species
Spinther alaskensis new species [*a*]

Family PHYLLODOCIDAE, nine species
Anaitides citrina (Malmgren) (Moore, 1908) [*f*]
Anaitides groenlandica (Oersted) (Murdoch, 1885) [*c, f, J*]
Anaitides medipapillata (Moore) (Treadwell, 1926) [*d*]
Anaitides mucosa (Oersted) (Moore, 1908) [*d, f*]
Eteone californica Hartman [*d*]
Eteone spetsbergensis Malmgren [*c, f, J*]
Eulalia viridis (Müller) [*e, f, J*]
Notophyllum foliosum (Sars) [*f*]
Notophyllum imbricatum Moore (Moore, 1906) [*e, J*]

Family ALCIOPIDAE, one species
Callizona angelini (Kinberg) (Moore, 1908) [*e*]

Family HESIONIDAE, two species
Psammate aphroditoides (Fabricius) (Chamberlin, 1920) [*b*]
Psammate multipapillata (Théel) Murdoch, 1885) [*b*]

Family SYLLIDAE, 13 species
Autolytus alexandri Malmgren (Chamberlin, 1920) [*f*]
Autolytus magnus Berkeley [*c*]
Autolytus prismaticus (Fabricius) (Chamberlin, 1920) [*b, c, J*]
Pionosyllis gigantea Moore (Moore, 1908) [*d*]

Pionosyllis magnifica Moore (Moore, 1906) [*d, J*]
Syllis quaternaria Moore (Moore, 1906) [*a*]
Trypanosyllis gemmipara Johnson [*d, J*]
Typosyllis alternata (Moore) (Moore, 1908) [*d, J*]
Typosyllis armillaris (Müller) (Moore, 1908) [*f, J*]
Typosyllis collaris new species [*a*]
Typosyllis elongata (Johnson) [*d*]
Typosyllis pulchra (Berkeley) [*c*]
Typosyllis stewarti (Berkeley) [*c*]

Family NEPHTYIDAE, seven species
Nephtys assimilis Malmgren (Moore, 1908) [*f*] (or possibly *Nephtys hombergi* Audouin and Edwards)
Nephtys ciliata (Müller) (Moore, 1908) [*e, f, J*]
Nephtys coeca (Fabricius) (Moore, 1908) [*e, f, J*]
Nephtys malmgreni Théel (Moore, 1908) [*f, J*]
Neyhtys punctata Hartman (Hartman, 1938) [*d*]
Nephtys rickettsi Hartman (Hartman, 1938) [*d*]
Nephtys schmitti Hartman (Hartman, 1938) [*d*]

Family NEREIDAE, 11 species
Ceratonereis paucidentata (Moore) (Moore, 1908) [*d*]
Cheilonereis cyclurus (Harrington) [*e, J*] (= *Nereis schischidoi* Izuka (Annenkova, 1938))
Neanthes brandti (Malmgren) (Moore, 1908) [*e*]
Neanthes virens (Sars) (Moore, 1908) [*e, f, J*]
Nereis neoneanthes new species [*c*]
? *Nereis heteropoda* Chamisso and Eysenhardt (Chamisso and Eysenhardt, 1821) [*a*]
Nereis pelagica Linnaeus (Moore, 1908) [*e, f, J*]
Nereis procera Ehlers [*d*]
Nereis vexillosa Grube (Grube, 1851) [*e, J*]
Nereis zonata Malmgren [*f, J*]
Platynereis agassizi (Ehlers) (Moore, 1908) [*e, J*]

Family SPHAERODORIDAE, one species
Sphaerodorum minutum (Webster and Benedict) (Chamberlin, 1920) [*f*]

Family GLYCERIDAE, two species
Glycera capitata Oersted (Moore, 1908) [*e, f, J*]
Hemipodus borealis Johnson [*d*]

Family GONIADIDAE, four species
Glycinde picta Berkeley (Berkeley, 1942) [*c*]
Glycinde wireni Arwidsson (Moore, 1908) [*c*]
Goniada annulata Moore (Moore, 1905) [*d*]
Goniada maculata Oersted (Berkeley, 1942) [*e, f, J*]

Family ONUPHIDAE, three species
Nothria conchylega (Sars) (Berkeley, 1942) [*e, f, J*]
Nothria geophiliformis (Moore) (Moore, 1908) [*e*]
Nothria iridescens (Johnson) (Moore, 1908) [*d*]

Family EUNICIDAE, one species
Eunice longicirrata Webster (Moore, 1908) [*d, f*]

Family LUMBRINERIDAE, seven species
Lumbrineris bicirrata Treadwell [*d*]
? *Lumbrineris fragilis* (Müller) (McIntosh, 1910) [*f, J*]
Lumbrineris heteropoda Marenzeller (Moore, 1908) [*e, J*]
Lumbrineris latreilli Audouin and Edwards [*d, f*]
Lumbrineris similabris Treadwell (Treadwell, 1926) [*c*]
Lumbrineris zonata (Johnson) [*d*]
Ninoë simpla Moore (Moore, 1908) [*a*]

Family ARABELLIDAE, two species
Drilonereis filum Claparède (Berkeley, 1942) [*f*]
Drilonereis nuda Moore [*d*]

Family DORVILLEIDAE, one species
Dorvillea pseudorubrovittata Berkeley [*c*]

Family ORBINIIDAE, four species
Haploscoloplos alaskensis new species [*a*]
Haploscoloplos elongata (Johnson) [*d*]
Naineris dendritica (Kinberg) (Treadwell, 1914) [*d*]
Scoloplos armiger (Müller) (? Murdoch, 1885; verified by Berkeley, 1942) [*e, f, J*]

Family PARAONIDAE, one species
Aricidea heteroseta new species [*a*]

Family SPIONIDAE, nine species
Anaspio boreus Chamberlin (Chamberlin, 1920) [*a*]
Laonice cirrata (Sars) [*e, f, J*]
Nerine alaskensis (Treadwell), new combination (Treadwell, 1914) [*a*]
Polydora giardi Mesnil [*d, f*]
Polydora socialis (Schmarda) [*d, f*]
Prionospio cirrifera Wirén (Berkeley, 1942) [*c*]
Prionospio malmgreni Claparède [*c, f, J*]
Scolecolepides arctius Chamberlin (Chamberlin, 1920) [*a*]
Spio filicornis (Müller) (Chamberlin, 1920) [*e, f, J*]

Family CHAETOPTERIDAE, one species
Chaetopterus variopedatus (Renier) (Berkeley, 1942) [*e, f*]

Family CIRRATULIDAE, four species
Acrocirrus heterochaetus Annenkova [*a, J*]
Cirratulus cirratus (Müller) (Grube, 1851) [*e, f, J*]
Cirratulus robustus Johnson (Treadwell, 1914) [*d*]
Tharyx hamatus new species [*a*]

Family ARENICOLIDAE, two species
Arenicola glacialis Murdoch (Murdoch, 1885) [*a*]
Arenicola pusilla Quatrefages (Treadwell, 1914) [*d*]

Family OPHELIIDAE, seven species
Ammotrypane aulogaster Rathke (Moore, 1908) [*d, f*]
Armandia bioculata Hartman [*d*]
Armandia brevis (Moore) (Moore, 1906) [*d*]
Ophelia limacina (Rathke) (Berkeley, 1942) [*d, f*]
Travisia brevis Moore (Berkeley, 1942) [*d*]
Travisia forbesii Johnston (Moore, 1908) [*f*]
Travisia pupa Moore (Moore, 1906) [*d*]

Family SCALIBREGMIDAE, one species
Scalibregma inflatum Rathke (Moore, 1908) [*c, f*]

Family FLABELLIGERIDAE, five species
Brada granulata Malmgren (Murdoch, 1885) [*f*]
Brada villosa (Rathke) (Moore, 1906) [*c, f*]
Flabelligera infundibularis Johnson (Treadwell, 1914) [*d*]
Stylarioides papillata (Johnson) (Moore, 1908) [*d*]
Stylarioides plumosa (Müller) (Berkeley, 1942) [*c, f*]

Family CAPITELLIDAE, three species
Capitella capitata (Fabricius) [*d, f*]
Heteromastus filiformis (Claperède) [*d, f*]
Notomastus giganteus Moore (Moore, 1906) [*a*]

Family MALDANIDAE, nine species
? *Asychis lacera* Moore [*d*]
Asychis similis (Moore), new combination (Moore, 1906) [*d*]
Clymenella tentaculata Moore (Moore, 1906) [*a*]
Maldane sarsi Malmgren (Moore, 1908) [*d, f*]
Maldanella robusta Moore (Moore, 1906) [*c*]
Nicomache lumbricalis (Fabricius) (Moore, 1906) [*d, f, J*]
Nicomache personata Johnson [*c*]
Notoproctus pacificus (Moore) (Moore, 1906) [*d*]
Petaloproctus tenuis borealis Arwidsson [*c*]

Family OWENIIDAE, one species
Owenia occidentalis (Johnson) (Treadwell, 1914) [*d*]

Family SABELLARIIDAE, two species
Idanthyrsus ornamentatus (Chamberlin) (Berkeley, 1942) [*e, J*] (Reported as *I. armatus* Kinberg)
Sabellaria cementarium Moore (Moore, 1906) [*e, J*]

Family STERNASPIDAE, two species
? *Sternaspis elegans* Chamisso and Eysenhardt (Chamisso and Eysenhardt, 1821) [*a*]
Sternaspis scutata Ranzani (Moore, 1908) [*e, f, J*]

Family PECTINARIIDAE, five species
Amphictene auricoma (Müller) (Moore, 1908) [*c, f*]
Cistenides brevicoma (Johnson) (Treadwell, 1914) [*d*]
Cistenides granulata (Linnaeus) (Chamberlin, 1920) [*c, f, J*]
Cistenides hyperborea Malmgren (Berkeley, 1942) [*f, J*]
Pectinaria belgica (Pallas) (Berkeley, 1942) [*d, f*]

Family AMPHARETIDAE, 15 species
Amage anops (Johnson) (Berkeley, 1942) [*e, J*]

Amphicteis alaskensis Moore (Moore, 1905) [*a*]
Amphicteis glabra Moore (Moore, 1905) [*d*]
Lysippe labiata Malmgren (Berkeley, 1942) [*c, f, J*]
Melinna cristata (Sars) (Moore, 1908) [*c, f, J*]
Melinna denticulata Moore (Moore, 1905) [*d*]
Neosabellides alaskensis Treadwell (Treadwell, 1943) [*a*]
Sabellides octocirrata Sars (Berkeley, 1942) [*a, f*]
Samytha sexcirrata (Sars) (Chamberlin, 1920) [*d, f*]

Family TEREBELLIDAE, 16 species

Amphitrite cirrata (Müller) (Moore, 1905) [*c, f*]
Eupolymnia crescentis Chamberlin [*d*]
Eupolymnia heterobranchia (Johnson) (Moore, 1908) [*d*]
Eupolymnia nesidensis japonica (Marenzeller) [*e*]
Leaena abranchiata Malmgren [*a, f, J*]
Leaena nuda Moore (Moore, 1905) (or possibly *Lanassa*) [*a*]
Neoamphitrite robusta (Johnson) (Moore, 1908) [*d*]
Neoleprea spiralis (Johnson) [*e, J*]
Nicolea zostericola (Oersted) [*a, f, J*]
Pista cristata (Müller) (Moore, 1908) [*e, f, J*]
? *Pista fasciata* (Grube) (Moore, 1908) [*c, f*]
Polycirrus sp. (Moore, 1908)
Spinosphaera sp.
Terebellides stroemi Sars (Moore, 1908) [*e, f, J*]
Thelepus crispus Johnson (Treadwell, 1914) [*d*]
Thelepus hamatus Moore (Moore, 1905) [*d*]

Family SABELLIDAE, 16 species

Chone gracilis Moore (Moore, 1906) [*c*]
Chone infundibuliformis Kröyer (Bush, 1904) [*e, f, J*]
Euchone analis (Kröyer) (Berkeley, 1942) [*c, f, J*]
Eudistylia polymorpha (Johnson) (Bush, 1904) (as *Bispira* by Annenkova) [*e, J*]
Eudistylia tenella Bush (Bush, 1904) [a]
Eudistylia vancouveri (Kinberg) (Bush, 1904) [*d*]
Megalomma splendida (Moore) (Moore, 1905) [*d*]
Myxicola aesthetica (Claparède) (Bush, 1904) [*d, f*]
Myxicola infundibulum (Montagu) (Bush, 1904) [*d, f*]
Potamilla neglecta (Sars) (Bush, 1904) [*d, f*]
Pseudopotamilla intermedia Moore (Moore, 1905) [*d*]
Pseudopotamilla occelata Moore (Moore, 1905) [*d*]
Sabella crassicornis Sars (Bush, 1904) [*d, f*]
Sabella media (Bush) (Bush, 1904) [*d*]
Schizobranchia dubia Bush (Bush, 1904) [*a*]
Schizobranchia insignis Bush (Bush, 1904) [*c*]

Family SERPULIDAE, 11 species and 5 questionable names

Chitinopoma occidentalis (Bush), new combination (Bush, 1904) [*d*]
Crucigera irregularis Bush (Bush, 1904) [*c*]
Crucigera zygophora (Johnson) (Bush, 1904) [*d, J*]
Paradexiospira violaceus (Levinsen) [*b*]
Serpula vermicularis Linnaeus (Bush, 1904) [*e, f, J*]
Spirorbis (*Laeospira*) *borealis* Daudin (Bush, 1904) [*d, f*]
Spirorbis quadrangularis Stimpson (Moore, 1908) [*a, f*]
Spirorbis semidentatus Bush (Bush, 1904) [*a*]
Spirorbis spirillum Linnaeus (Moore, 1908) [*e, f, J*]
Spirorbis tridentata Levinsen (Moore, 1908) [*a, f*]
Spirorbis variabilis Bush (Bush, 1904) [*a*]
? *Spirorbis abnormis* Bush (Bush, 1904) [*a*]
? *Spirorbis incongruus* Bush (Bush, 1904) [*a*]
? *Spirorbis lineatus* Bush (Bush, 1904) [*a*]
? *Spirorbis rugatus* Bush (Bush, 1904) [*a*]
? *Spirorbis similis* Bush (Bush, 1904) [*a*]

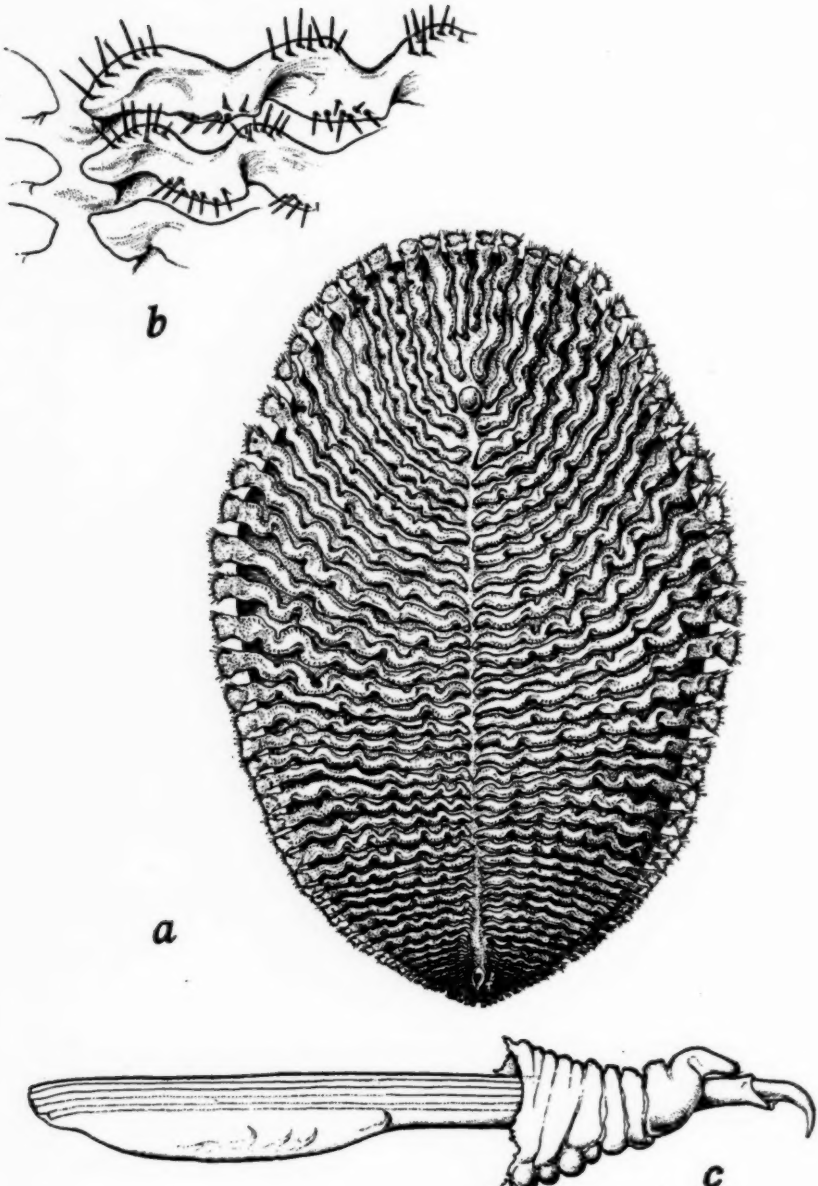

FIG. 1. *Spinther alaskensis* new species: *a*, entire animal in dorsal view, × 6.4; *b*, portions of typical notopodial ridges from the dorsal region to show the alternation of setae in anterior and posterior margins, enlarged; *c*, neuropodium from a median segment, in anterior view, showing the acicular sac and developing setae torn from the body wall, enlarged.

Except for the pelagic families of polychaetes, the only ones not known to be represented are the following: Pareulepidae, Palmyridae, Amphinomidae, Typhloscolecidae, Pilargiidae, Lysaretidae, Apistobranchidae, Magelonidae, Disomidae, and Ctenodrilidae. With the exception of the Amphinomidae, these are small families which rarely occur in collections. The amphinomids are largely tropical.

DISCUSSION

Family APHRODITIDAE

Genus APHRODITA Linnaeus

Aphrodita japonica Marenzeller

Aphrodita Japonica Marenzeller, 1879: 111–112, pl. 1, fig. 2; Moore 1908: 338–339; Hartman, 1939: 21–22, pl. 1, fig. 1–5; Berkeley, 1924: 187.

Collections. Stations 116–40 (1); 131–40 (1); 135–40 (2); 138–40 (1); 139–40 (1); 140–40 (3).

Some are very large, measuring 4.5 inches long and 2.25 inches wide. The lateral hairs are long but only slightly opalescent. This species is known to range throughout the northern Pacific and southward; present records are from Alaska in 28 to 48 fm.

Family POLYNOIDAE

Genus ARCTONOE Chamberlin

Arctonoë fragilis (Baird)

Lepidonotus fragilis Baird, 1863: 108.

Polynoë fragilis Johnson, 1897: 179–181, pl. 7, fig. 36, 45, pl. 8, fig. 52.

Arctonoë fragilis Hartman, 1938*c*: 116; Berkeley, 1942: 188.

Collections. Stations 24–40 (2); 25–40 (1); 34–40 (1).

This species is widely known through the northeast Pacific; it is free-living or associated with echinoderms. The present records are from Canoe and Pavlof bays, in 25 to 150 fm.

Arctonoë vittata (Grube)

Fig. 2 *a-f*.

Polynoë vittata Grube, 1855: 82–83.

Polynoë lordi Johnson, 1897: 175–177, pl. 7, fig. 35, 44, pl. 8, fig. 51.

Halosydnoides vittata Okuda, 1936: 565–568, fig. 4, 5.

Arctonoë vittata Hartman, 1939: 29–30, pl. 3, fig. 33–37; Berkeley, 1942: 188.

Collections. Stations 20–40 (2); 21–40 (1); 20–40 to 22–40 (2); 34–40 (1); 35–40 (1); 59–40 (1); 70–40 (1); 71–40 (2); 80–40 (1); 83–40 (1); 129–40 (1); 131–40 or 132–40 (1); BT 70–41 (1); C 44–41 (2); C 71–41 (1); L 4–41 (4).

These collections include individuals with at least three color patterns. One group is pale with a broad dark band across the dorsum anteriorly; the individuals come from stations 20–40 to 22–40, 59–40, 80–40, 83–40, 129–40 and C 71–41. Another group has elytra more or less intensely mottled, as shown by Okuda (1936: 566); these individuals come from stations 21–40, 34–40, 35–40, 71–40 and BT 70–41. A third group has elytra with a narrow dark edge on the inner and posterior margins; the individuals are from station L 4–41. In addition, there are some individuals that are entirely pale (preserved), coming from stations 70–40, 71–40, 131–40 or 132–40 and C 44–41. For each of these groups the characteristic setae from the notopodium and neuropodium of the second segment (first setigerous segment) have been examined and found to agree in details as shown in figures of notosetae (Fig. 2 *a*, 2 c) and neurosetae (Fig. 2 *b*, 2 *d*) from stations 71–40 and 80–40, and two notosetae (Fig. 2 *e*, 2 *f*) from station L 4–41.

A. vittata is frequently associated with mollusks, echinoderms or other chaetopods, or it

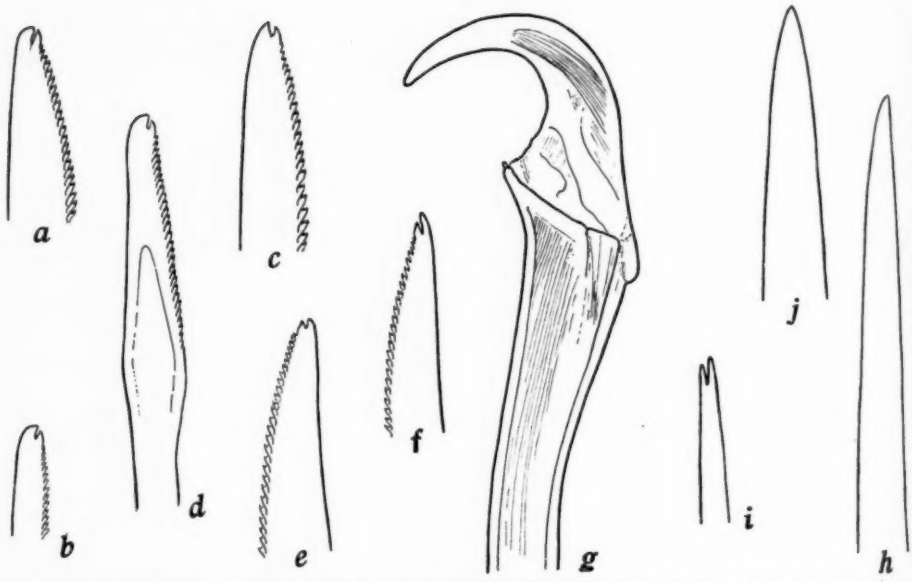

FIG. 2. Species of *Arctonoë* and *Spinther*. *a–f, Arctonoë vittata* (all figures are distal ends of notosetae and neurosetae from the first setigerous segment, × 425): *a*, notoseta and *b*, neuroseta from station 71–40; *c*, notoseta, and *d*, neuroseta from station 80–40; *e*, worn notoseta, and *f*, unworn notoseta from station L 4–41. *g–j, Spinther alaskensis: g*, neuropodial hook from a median segment, × 100; *h, j*, entire notopodial setae from a median segment showing variation in tips, × 425; *i*, bifid notopodial seta, × 812.

may be free living. The present records are from known ranges in western and southern Alaska, in 5 to 150 fm., and from the Bering Sea in 33 fm.

Genus LEPIDONOTUS Leach

Lepidonotus robustus Moore

Lepidonotus robustus Moore, 1905*a*: 544–546, pl. 36, fig. 32–35.

Collections. Stations 51–40 (3); 61–50 (1); Canoe or Pavlof Bay (1).

These individuals agree closely with Moore's description (1905: 544). It now seems doubtful that this species is actually the same as *L. helotypus* (Grube) (1877: 49) originally described from China, although earlier I (1938*c*: 109) followed Seidler (1924: 56) in referring it to the latter. *L. helotypus* is said to have small, dark, nailheaded spines on elytra. There are none on the present individuals or on those of the original collection (*loc. cit.*).

L. robustus was first described from Shelikof Strait, Alaska, in 48–65 fm. The present records are from Canoe Bay and Cold or Pavlof Bay, in 15 to 40 fm., not far from the type locality.

Genus HALOSYDNA Kinberg

Halosydna brevisetosa Kinberg

Halosydna brevisetosa Kinberg, 1857: 18, pl. 5, fig. 25; Berkeley, 1942: 189.

Polynoë brevisetosa Johnson, 1897: 167–170, pl. 6, fig. 24, pl. 7, fig. 31, 40, pl. 8, fig. 46.

Collections. Station 51–40 (1).

This well-known species is common throughout the northeast Pacific, from Alaska south to southern California. It is sometimes commensal, in tubes of other chaetopods, where it attains comparatively great size. The present record is from Canoe Bay in 25 to 40 fm.

Genus HOLOLEPIDA Moore

Hololepida magna Moore

Hololepida magna Moore, 1905*a*: 541–544, pl. 35, fig. 24–29; Moore, 1908: 320; Berkeley, 1923: 214.

Collection. Station L 13–41 (1).

This is known only from southern Alaska and British Columbia; it ranges in depths of 13 to 230 fm.

Genus HOLOLEPIDELLA Willey

Hololepidella tuta (Grube)

Polynoë tuta Grube, 1855: 82.
Harmothoë tuta Johnson, 1901: 394–396, pl. 2, fig. 18, 19, pl. 3, fig. 20–22.
Hololepidella tutta Annenkova, 1937: 147, pl. 3, fig. 15, 16.
Polyeunoa tuta Berkeley, 1942: 188.

Collections. Stations 35–40 (fragment); 59–40 (short fragment); 60–40 (1); D 3–41 (2).

Originally described from Sitka, Alaska, this has been widely reported from both sides of the north Pacific (see synonymy above). The present records are from southwest Alaska in 20 to 30 fm.

Genus HARMOTHOE Kinberg

Harmothoë imbricata (Linnaeus)

Harmothoë imbricata Johnson, 1897: 181, pl. 7, fig. 37; Fauvel, 1923: 55, fig. 18; Berkeley, 1923: 215; Berkeley, 1942: 187.

Collections. Stations 12–40 (1); 24–40 (1); 27–40 (1); 33–40 (1); 34–40 (1); 47–40 (1); 51–40 (about 15); 59–40 (1); 61–40 (1); 72–40 (1); 89–40 (1); 97–40 (3); 108–40 (1); CT 12–41 (1); D 7–41 (1); D 15–41 (12); L 2–41 (1); L 3–41 (2); L 20–41 (3); Lazy Bay (1); Seldovia (1).

Color patterns are highly variable. Some individuals have elytra more or less heavily mottled with gray to russet pigment; others have the first pair pale, the rest dark; a few individuals are striped longitudinally, the elytra dark brown on the inner portions and pale on the outer parts. In all individuals, notosetae are coarser than neurosetae; the latter are distinctly bidentate at the distal ends. The dorsum is completely covered by the imbricated elytra. On the prostomium, anterior eyes are far forward, under the prostomial peaks and directed anteriorly. The elytra are thick and leathery in texture, sparsely fringed along their outer free margins, oval in shape. Dorsal cirri are smooth except for a few short, scattered papillae. Nephridia are very long and slender; they are clearly seen on the ventral side of parapodia.

H. imbricata is common in colder waters of the north Pacific, south at least to central California. The present records are from southwest Alaska and Bering Sea, from shore to 150 fm.

Genus EVARNELLA Chamberlin

Evarnella triannulata (Moore)

Harmothoë triannulata Moore, 1910: 346–350, pl. 29, fig. 18–22.
Evarne triannulata Berkeley, 1923: 215.
Evarnella triannulata Berkeley, 1942: 188.

Collections. Stations 21–40 (1); 33–40 (1); 51–40 (6); 58–40 (1); 59–40 (1); 60–40 (4); 61–40 (5); 72–40 (1); 89–40 (1); 93–40 (1); 100–40 (1); 128–40 (4); A 8–41 (1); C 5–41 (2); D 7–41 (2); D 8–41 (2); D 11–41 (4); L 18–41 (1); Sand Point (1).

The body consists of 39 or 40 segments; elytra number 15 pairs and cover most of the body except the last five or six short segments. Elytra are oval, the margin nearly entire except for a delicate fringe; they are more or less completely and closely covered by fine, slender, minute, dark spines; at the posterior margin there are a few larger, long, dark-brown, pendant-like papillae. The prostomium has broad peaks; the four eyes are large, the anterior pair is lateral in position, just in front of the middle half of the prostomial length. Neurosetae have a long main tooth and a small, short subterminal secondary tooth.

This species was originally described off southern California in 38 to 238 fm.; it has since been reported from British Columbia, in

15 to 20 fm. (Berkeley, 1923) and 555 meters (Berkeley, 1942). The present records are from southern Alaska and Bering Sea, in 13 to 68 fm.

Genus EUNOE Malmgren

Eunoë depressa Moore

Eunoë depressa Moore, 1905*a*: 536–538, pl. 34, fig. 17, 18, pl. 35, fig. 19, 20.

Collections. Stations 33–40 (1); 34–40 (6); 58–40 (1); 61–40 (2); 70–40 (1); 80–40 (3); 97–40 (1); 98–40 (1); 103–40 (1); BT 70–41 (1); C 147–41 (1); C 150–41 (1); D 7–41 (4); D 15–41 (1); D 16–41 (1).

The size of these individuals varies greatly, ranging from a few mm. long (juvenile) to comparatively gigantic; a large one measures 68 mm. long, without the everted proboscis, which is 28 mm. long; width is 25 mm. without, 35 mm. with, parapodia. Elytra are thick, leathery in texture and have entire margin; they are pale but are mottled with rust-colored pigment. Their surface is covered with low, flattened nodules of varying sizes, and a few larger ones are more or less limited to the posterior half of the elytral surface. The prostomium has four dark eyes; the anterior pair is lateral, near the middle of the prostomial length.

Some collections have data recording commensalism with hermit crabs; a small, probably juvenile, individual from station D 16–41 comes from the body cavity of a large Alaskan king crab, *Paralithodes camtschatica* (Tilesius). The large body size of some adults is perhaps correlated with a commensalistic habit.

This species has remained unknown except through its original account, based on collections from Alaska, in 8 to 19 fm.; some of these were labeled hermit crab messmates (Moore, 1905: 538). The present records are from southwestern Alaska in 5 to 150 fm., and from Bering Sea in 15 to 60 fm.

Genus GATTYANA McIntosh

Gattyana cirrosa (Pallas)

Aphrodita cirrhosa Pallas, 1766: 95–97, pl. 8, fig. 3–6.

Gattyana cirrosa Moore, 1908: 337; Fauvel, 1923: 49–50, fig. 17; Berkeley, 1942: 187.

Collections. Stations 33–40 (4); 35–40 (2); 51–40 (1); 61–40 (1); 128–40 (4); 131–40 (1); Mist Harbor (1); Pavlof Bay (1).

This species has been widely reported from the colder waters of the Northern Hemisphere, including both sides of North America. The present records are from southwestern Alaska in 15 to 50 fm.

Gattyana iphionelloides (Johnson)

Harmothoë iphionelloides Johnson, 1901: 391–392, pl. 1, fig. 2–7.

Gattyana iphionelloides Berkeley, 1945: 321.

Collection. Station 106–40 (1).

This species is known from Washington (Johnson), western Canada (Berkeley), and a reef in Alitak Bay, Alaska; it is intertidal.

Genus HERMADION Kinberg

Hermadion truncata (Moore)

Harmothoë (*Eunoa*) *truncata* Moore, 1902: 272–274, pl. 14, fig. 21–28.

Hermadion truncata Moore, 1908: 332–333; Berkeley, 1923: 215; Berkeley, 1945: 323.

Collection. Station 91–40 (1).

Originally the type locality was given as northern Greenland (Moore, 1902) but was later (Moore, 1908) corrected to Icy Cape, Alaska. Berkeley (1923) has recorded the species from British Columbia. The present record is from Baralof Bay, in 24 fm.

Family POLYODONTIDAE

Genus PEISIDICE Johnson

Peisidice aspera Johnson

Peisidice aspera Johnson, 1897: 184–185, pl. 9, fig. 56–59, pl. 10, fig. 63; Moore, 1908: 338; Berkeley, 1923: 216; Berkeley, 1942: 189.

Collections. Stations 20–40 to 22–40 (1); 60–40 (2); 61–40 (2); 70–40 (6).

This species is known to range widely through the northeastern Pacific. The present records are from southwestern Alaska, in 15 to 40 fm.

Family SIGALIONIDAE

Genus PHOLOE Johnston

Pholoë minuta (Fabricius)

Aphrodita minuta Fabricius, 1780: 314.
Pholoë minuta Moore, 1908: 338; Fauvel, 1923: 121–122, fig. 44; Berkeley, 1942: 189.

Collections. Stations 51–40 (1); 60–40 (1).

The present records are within the known range; they come from Canoe Bay and Leonard Harbor, in 20 to 40 fm.

Family CHRYSOPETALIDAE

Genus PALEANOTUS Schmarda

Paleanotus chrysolepis Schmarda

Paleanotus chrysolepis Schmarda, 1861: 163, pl. 37, fig. 326–329; Berkeley, 1942: 27.
Heteropale bellis Johnson, 1897: 163–164, pl. 6, fig. 20–23; Berkeley, 1923: 212.

Collection. Station 60–40 (2).

This record is in the known range, from southwestern Alaska in 15 to 40 fm.

Family SPINTHERIDAE

This family is known through a single genus, *Spinther* Johnston. The body is broad, flat, and sole-like. The entire dorsum is covered with transversely prolonged notopodial ridges; these are continued around the front to encompass the prostomial parts so that those of the two sides merge at the middle front. The ventral side of the body is papillated or smooth. The prostomium is a tiny, inconspicuous lobe, with or without eyes; it is set some distance back, between the notopodial ridges and immediately over the ventral mouth. There is a small, conical or subspherical, median prostomial antenna that largely covers the prostomium. The proboscis is a voluminous, unarmed, rosette-like, eversible organ.

Parapodia are biramous. Notopodia are long, transversely arranged, dorsal ridges; they are provided with many spine-like setae that are arranged in transverse rows; they have entire or bifid tips. Neuropodia are long, lateral extensions of the body wall; they may or may not have a distal extension (called a cirrus); they are armed with one to several, strong, falcate, composite, yellow hooks that are encased in an embedded bundle of slender acicula (Fig. 1 *c*). The anal aperture is dorsal, near the posterior end of the body.

In so far as known, all species occur on the surface of sponges, in shallow to moderate depths.

Genus SPINTHER Johnston

Spinther Johnston, 1845
Oniscosoma Sars, 1851
Cryptonota Stimpson, 1854

Type *S. oniscoides* Johnston

Three species, *S. oniscoides* Johnston, *S. miniaceus* Grube, and *S. arcticus* Wirén, were recognized and described in von Graff's revision (1888), but the first of these with some reserve because of the ambiguity surrounding Johnston's description. Riddell (1909: 101–108) clarified this doubt, after a study of topotypes of *S. oniscoides,* and showed that von Graff's first species is actually *S. citrina* (Stimpson), and that *S. oniscoides* Johnston, constitutes a fourth species. Since then, a fifth species, *S. australiensis* Augener (1913), has been described.

Confusion still prevails (see Fauvel, 1923: 140) concerning the specific names of von Graff, especially since the rules of nomenclature were not applied in the choice of acceptable names. Thus, although von Graff showed conclusively that *Oniscosoma arcticum* Sars (1851)

is the same as *Spinther miniaceus* Grube (1860), he retained the second name since it was deemed undesirable to retain the first for a form that may be southern in distribution. However, a specific name may not be rejected for inappropriateness (Article 32, Int. Rules Zoöl. Nomen.). Furthermore, the name *Spinther arcticus* Wirén (1883) was retained for another species which differs from the older *S. arcticus* (Sars). Again, the rules of nomenclature dictate that a specific name is to be rejected as a homonym when it has been previously used for another species of the same genus (Article 35). *S. arcticus* (Sars) therefore has priority over *S. miniaceus* Grube, and the latter becomes a synonym of the former. *S. arcticus* Wirén is a homonym and to be rejected. I propose *S. wireni,* new name, for the latter species.

The name *S. major* Levinsen (1883) was proposed to replace *S. arcticus* Hansen (1882) (not Sars nor Wirén). It was shown by von Graff (1888) to be the same as *S. oniscoides* [=*S. citrina* (Stimpson)].

The known species of *Spinther* are thus: (1) *S. arcticus* (Sars), which includes *S. miniaceus* Grube, from western and southern Europe; (2) *S. australiensis* Augener, from southwestern Australia; (3) *S. citrina* (Stimpson), which includes *S. oniscoides* von Graff (not Johnston), from eastern Canada and the New England states; (4) *S. oniscoides* Johnston, from Ireland; and (5) *S. wireni,* new name, which includes *S. arcticus* Wirén, not Sars, nor Hansen, from Bering Sea. A sixth species, *S. alaskensis,* is newly described below.

Key to Species of *Spinther*

1. Ventrum papillate..... 2
1. Ventrum smooth or only wrinkled..... 4
2. Distal end of neurosetal shaft crenulate; notosetae largely entire at tip, a few bifid.....*S. citrina* (Stimpson)
2. Distal end of neurosetal shaft trilobate; notosetae entire except for a very few, very slender, bifid ones.....*S. alaskensis* new species
2. Distal end of neurosetal shaft entire..... 3
3. Notosetae bifid only....*S. oniscoides* Johnston
3. Notosetae bifid and entire, in equal number and about equally thick.....*S. wireni* new name
4. Neurosetae with a large lateral tooth.....*S. australiensis* Augener
4. Neurosetae without a lateral tooth.....*S. arcticus* (Sars)

Chart Showing Comparison of Characters for Species of *Spinther*

Name of Species	Ventrum	Parapodial Cirri	Neurosetae		Notosetae	Number of Segments	Length in mm.
			Shape	Distal end of shaft			
S. oniscoides Johnston	papillate	present	falcate smooth	smooth	bifid only (Riddel, 1909: 103)	20–25	4–13
S. citrina (Stimpson)	papillate	present	falcate smooth	crenulate	largely entire, a few bifid, the 2 equally thick (Graff, 1888: 17)	30–48	11–26
S. wireni new name	papillate	present	falcate smooth	smooth	bifid and entire in equal number and equally thick	43–52	20–25
S. alaskensis new species	papillate	present	falcate smooth	trilobed	entire except for very few, very slender bifid ones	46–47	*ca.* 28
S. arcticus (Sars)	smooth	absent	falcate smooth	entire	bifid only	12–24	1–9
S. australiensis Augener	smooth	absent	falcate, lateral tooth	? entire	bifid only	15–31	4.5–7.5

Spinther alaskensis new species

Fig. 1 *a-c*, 2 *g-j*.

Collections. Stations 51–40 (1); 66–40 (2).

The largest individual measures 28 mm. long and 20 mm. wide. Number of segments is 46 or 47. The first two segments, preceding the prostomium, and the last six or seven, following the pygidium, are short and incomplete middorsally. The dorsum is slightly arched and nearly uniformly covered with notopodial ridges except for a narrow, median, longitudinal stripe (Fig. 1 *a*). The ventrum is flat and solelike; it is more or less completely covered with segmentally arranged rows of spherical papillae, strewn thickly over the neuropodial bases and less so medially; the segmental intervals are smooth. A broad, median region has similar papillae but much sparser and irregularly dispersed.

The prostomial appendage is a spherical (Fig. 1 *a*) (station 66–40) or elongate (station 51–40) papillar lobe. The prostomium is low and has two pairs of large, oval, reddish-brown eyespots, located in the groove where the lobe and body join; the anterior eyes are the larger but the two of a side nearly merge with each other.

The notopodial ridges (dorsal lamellae) have wavy fore and hind margins; the waves correspond in their distribution with that of the setal fascicles, the concavity lacks setae, the convexity has them. The anterior and posterior margins of the lamellae are about equally developed. The first two pairs of notopodia, in front of the prostomium, are directed forward (Fig. 1 *a*); the third pair is in line with the prostomium and farther back they are lateral in position. The most posterior are directed back so as to surround the anal region. The notopodial setae are arranged in alternating series (Fig. 1 *b*) along the membranous margins of the ridges. In median parapodia, where they have their maximum development, there are about 16 sets of setal fascicles in a notopodium; they consist of eight sets in the anterior margin and alternate with the same number of sets in the posterior margin. Each set consists of a fan-shaped fascicle of about nine setae, but some setae are embedded and visible only by dissection. The total number of setae in a ridge approximates 140 to 200. The symmetry of this pattern on a well-preserved individual is a striking feature and may signify a unique structural character in the functioning of the individual, perhaps to aid the flow of water forward and back.

Notopodial setae are of two kinds (Fig. 2 *b-j*). They consist of thick, bluntly pointed, straight, acicular spines numbering eight to ten in each fan-shaped fascicle and a few, very slender, delicate rods that are slightly curved and distally bifid (Fig. 2 *i*). The thickness of the latter is only one-fourth to one-sixth that of the larger spines; they are thus easily overlooked.

Neuropodia are long and thick; they taper distally and are provided with a thick, conical, superior lobe (Fig. 1 *c*) that is somewhat postsetal in position. Their bases are strongly wrinkled as though capable of great lateral extension, and the ventral side is covered with spherical papillae that resemble those on the ventral side of the body. One, seldom two, large composite, yellow hooks project from the distal end of the neuropodium. These large hooks are flat and knifelike; their appendage is strongly curved. The distal end of the shaft, at its longest part, is weakly trilobed (Fig. 2 *g*). The embedded part of the setal bundle, by dissection, is seen to consist of several developing, composite hooks, in various stages of growth; they are surrounded by an enveloping acicular bundle. The acicula are long, slender, tapering, pale rods (Fig. 1 *c*).

The proboscis, partly everted in one individual, but observed also by dissection, is a soft, voluminous, rosette-shaped sack, as is typical of the genus.

S. alaskensis belongs to the group of species in which the ventrum is papillose. It has notopodial setae with tips that are both entire and bifid. To this group belong also *S. citrina*

(Stimpson) and *S. wireni,* mihi. In the latter, the bifid and entire notosetae are about equal in number and equally thick; in the former they are also about equally thick. In *S. alaskensis,* the bifid setae are not only very few in number but are much more slender and very inconspicuous. *S. alaskensis* attains greater size than other species of the genus, but this character, as also the approximate segmental count, may have little significance (see chart on p. 16).

Holotype in the U. S. National Museum.

Type locality. Canoe Bay, Alaska, in 25 to 40 fm.

Distribution. Southern Alaska.

Family PHYLLODOCIDAE

Genus NOTOPHYLLUM Oersted

Notophyllum imbricatum Moore

Fig. 3 *a-c.*

Notophyllum imbricatum Moore, 1906*a*: 217–219, pl. 10, fig. 1–3; Moore, 1908: 329; Berkeley, 1924: 287; Berkeley, 1942: 190.

Collection. Station 12–40 (2).

Dorsal cirri are thick, deeply and broadly imbricated, and uniformly drab green; they are slightly narrowed distally; sixteenth and postmedian ones are shown in Figure 3 *c, b.* Neuropodia taper distally and are notched at the end of the acicular lobe (Fig. 3 *a*). There are two pairs of nuchal lappets or there may be an additional tiny pair on the inner side.

This is known only from the northeast Pacific; the present record is from the shore of Canoe Bay.

Notophyllum foliosum (Sars)

Fig. 3 *d-f.*

Phyllodoce foliosa Sars, 1835: 60–61, pl. 9, fig. 26.

Notophyllum foliosum Fauvel, 1923: 170–171, fig. 16.

Collections. Station L 18–41 (1); Sand Point (1).

This is smaller than *N. imbricatum* (above). There is a single pair of broad nuchal lappets. Dorsal cirri are imbricated; they are suffused and streaked with dark pigment, most intense at the outer periphery. Dorsal cirri are more broadly rounded distally than in *N. imbricatum;* sixteenth and postmedian ones are shown in Figure 3 *f, e.* Posterior neuropodia lack a deep incision (Fig. 3 *d*).

This has remained unrecorded from the Western Hemisphere. The present records are from Bare Island in 13 to 15 fm, and from Sand Point.

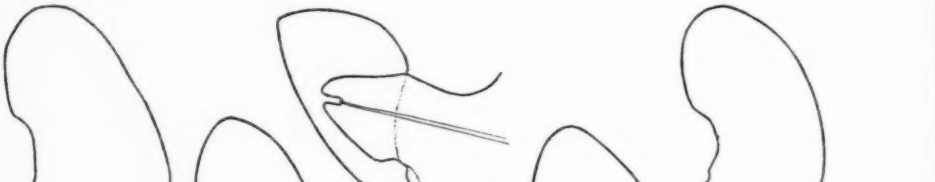

FIG. 3. Species of *Notophyllum. a–c, Notophyllum imbricatum: a,* postmedian neuropodium in anterior view, setae omitted, × 75; *b,* postmedian dorsal cirrus, × 15; *c,* sixteenth dorsal cirrus, × 15. *d–f, Notophyllum foliosum: d,* postmedian neuropodium in anterior view, setae omitted, × 60; *b,* postmedian dorsal cirrus, × 15; *f,* sixteenth dorsal cirrus, × 15.

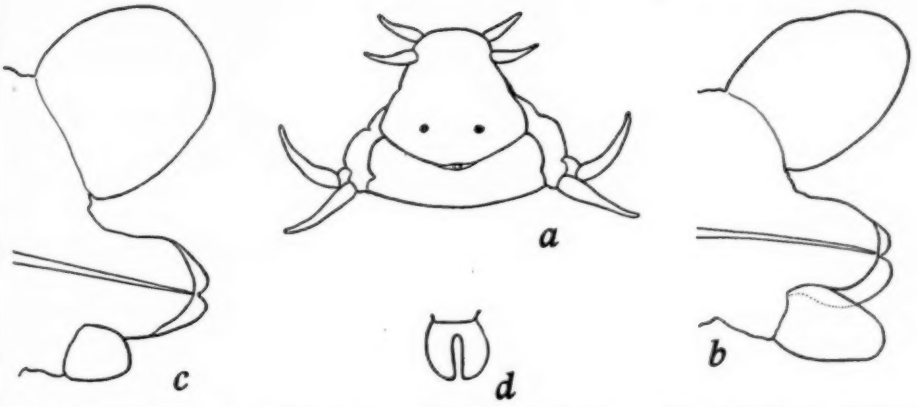

FIG. 4. *Eteone californica* (station 47–40): *a*, anterior end in dorsal view, enlarged (the prostomial eyes are deep seated); *b*, ninth parapodium in posterior view, × 99; *c*, far posterior parapodium in posterior view, × 99; *d*, anal cirri, enlarged.

Genus ANAITIDES Czerniawsky

Key to Species of *Anaitides*

1. Ventral cirri taper distally to a sharp point.....*A. mucosa*
1. Ventral cirri distally blunt or rounded.... 2
2. Proboscis with six rows of papillae on a side, with 12 or 13 in each row..... .....*A. groenlandica*
2. Proboscis with only four rows of papillae on a side and about four papillae in each row.....*A. citrina*

Anaitides groenlandica (Oersted)

Phyllodoce groenlandica Oersted, 1843: 192–193, fig. 19, 20, 22, 29–32.

Anaitides groenlandica Bergström, 1914: 141–143, fig. 41; Berkeley, 1924: 287; Berkeley, 1942: 189.

Collections. Stations 9–40 (1); 51–40 (5); D 14–41 (14); Canoe or Pavlof Bay (1).

This is a large, robust species. The proboscis has six rows of papillae on a side, with 12 or 13 in each row, at the middle of the series. Dorsal cirri are large and the distal ends are truncate.

Originally described from Greenland, this has been reported from both sides of northern North America. The present individuals were dredged from Canoe Bay and the Bering Sea.

Anaitides mucosa (Oersted)

Phyllodoce mucosa Oersted, 1843: 31, fig. 25, 79, 83, 89; Moore, 1908: 328.

Anaitides mucosa Bergström, 1914: 143–144, fig. 43.

Phyllodoce citrina Berkeley, 1924: 287.

Phyllodoce (*Anaitides*) *mucosa* Berkeley, 1945: 324.

Collection. Station 131–40 (1).

Dorsal cirri are trapezoidal in shape; ventral cirri are broad basally, acutely pointed distally. This species has been recorded previously from Alaska (Moore, 1908: 328). The present record is off Cape Chiniak, in 32 to 35 fm.

Anaitides citrina (Malmgren)

Phyllodoce citrina Malmgren, 1866: 95–96, pl. 13, fig. 24; Moore, 1908: 328; Fauvel, 1923: 150, fig. 52.

Anaitides citrina Bergström, 1914: 140–141, fig. 41.

Phyllodoce (*Anaitides*) *citrina* Berkeley, 1945: 324.

Collections. Stations 12–40 (1); 35–40 (1, juvenile).

The proboscis has only four rows of papillae on a side, with about four papillae in each row. This species has been recorded from Afognak Island, Alaska (Moore, 1908), and western Canada (Berkeley, 1945); the present records are from the vicinity of Pavlof Bay.

Genus EULALIA Savigny

Eulalia viridis (Müller)

Fig. 5 *a.*

Nereis viridis Müller, 1771: 156.

Eulalia viridis Fauvel, 1923: 160, fig. 57; Berkeley, 1924: 288; Berkeley, 1942: 189.

Collections. Stations 21–40 (1); 20–40 to 22–40 (4); 24–40 (1); 47–40 (1); 51–40 (3).

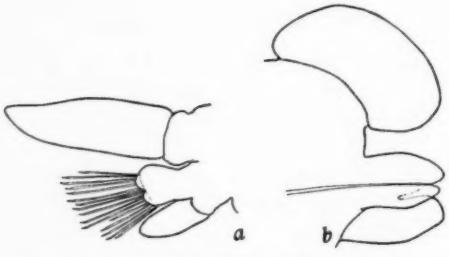

FIG. 5. Species of *Eulalia* and *Eteone*. *a, Eulalia viridis* (station 24–40): 118th or twenty-second last parapodium in anterior view showing long dorsal cirrus, × 61. *b, Eteone spetsbergensis* (station D 14–41): postmedian parapodium, × 48.

The number of segments is about 140, length is 32 mm. The proboscis is closely covered with papillae. Dorsal cirri are considerably prolonged, fully three to four times as long as wide (Fig. 5 *a*); ventral cirri extend distally beyond the setal lobes.

This cosmopolitan species has been reported previously from the northeast Pacific (Berkeley, 1924 and 1942). The present records are from southwestern Alaska, taken in shallow dredging.

Genus ETEONE Savigny

Eteone spetsbergensis Malmgren

Fig. 5 *b.*

Eteone spetsbergensis Malmgren, 1866: 102, pl. 15, fig. 38; Bergström, 1914: 202–204, fig. 77; Berkeley, 1945: 325.

Collection. D 14–41 (1).

A single, large, robust individual, 60 mm. long, with eggs, has the 15 last segments regenerated. The dorsum is pale and has a broad, longitudinal, reddish-brown stripe on either side, most intense in the anterior half; the pigment does not cover the dorsal or ventral cirri. Throughout the body the dorsal cirri are broader than long and are asymmetrical; the ventral cirri are distally blunt (Fig. 5 *b* shows a parapodium from a postmedian segment).

This Arctic species has been reported from the Bering Sea by Bergström (1914), and from western Canada by Berkeley (1945); the present collection comes from the Bering Sea, in 36 fm.

Eteone californica Hartman

Fig. 4 *a-d.*

Eteone californica Hartman, 1936*a*: 131, fig. 49–51.

Collections. Stations 47–40 (4); 60–40 (1); 108–40 (7); Dolgai Harbor (3).

The color (preserved) is dull green, most intense on dorsal and ventral cirri. These individuals are fully four to five times as large as some from the type locality (San Francisco Bay, California). The prostomium has two embedded, dark eyes, and a tiny nuchal papilla at its posterior margin (Fig. 4 *a*). The proboscis terminates distally in 14 soft, subglobular papillae; its proximal portion is smooth. The first setigerous segment is smaller than those following and it lacks dorsal cirri. In the anterior region the ventral cirri extend distally about as far as the setigerous lobe (Fig. 4 *b*), but by the twenty-fourth segment the ventral cirri are shorter and come to be inconspicuous (Fig. 4

c) in postmedian segments. The anal ring has a pair of short, blunt processes (Fig. 4 *d*).

This species is known from central California, shore, and western Mexico (Rioja, 1941: 687); the range is hereby extended to southwestern Alaska, from shore to 25 fm.

Family SYLLIDAE

Genus TYPOSYLLIS Langerhans

Key to Species of *Typosyllis*

1. Prostomium partly covered by a nuchal collar (Fig. 6 *a*) ..... *T. collaris*
1. Prostomium without a nuchal collar 2
2. Setae distally bidentate 3
2. Setae distally entire 5
3. Anterior dorsum with a pigment pattern consisting of broken transverse lines.. ..... *T. armillaris*
3. Dorsum without pigment pattern (preserved) 4
4. Superior setae in anterior segments with long appendage; articulation of setae complete ..... *T. alternata*
4. Superior setae in anterior segments with shorter appendage; articulation of setae incomplete ..... *T. elongata*
5. Larger, 100 mm. long or longer; dorsal cirri short ..... *T. stewarti*
5. Smaller, about 30 mm. long; dorsal cirri long ..... *T. pulchra*

Typosyllis alternata (Moore) new combination

Syllis alternata Moore, 1908: 323–325, fig. *a–f*; Berkeley, 1923: 206; Berkeley, 1938: 37–38.

Collections. 35–40 (1); Lazy Bay (4).

Setae are entirely composite; this species is therefore referred to the genus *Typosyllis*. There are four atokous individuals, and a female epitokous stolon from Lazy Bay. Antennae and dorsal cirri are clearly articulate throughout. In the anterior region, dorsal cirri are about equally long, but thereafter they alternate long and short, the number of articles ranging from 25 to 18. Ventral cirri are fairly long throughout. Setae are of a single kind, distally bidentate, but those in the superior part of the fascicle, especially in anterior segments, tend to have long appendages. Superior and inferior setae from a postmedian segment are similar to anterior setae but somewhat thicker and have a shorter appendage. Acicula are yellow and distally knobbed.

A female epitokous individual consists of head and 26 setigerous segments; swimming setae are present on all except the first segment. The prostomium is bilobed and has four reddish eyes. The anterior ones are much the larger and oblong in shape; they are antero-ventral in position and have elongate lenses; the posterior eyes are circular in shape.

Syllis harti Berkeley (1941: 36) from British Columbia, Canada, also appears to be a *Typosyllis*, since it is provided with only composite setae. It bears resemblance to *T. alternata*, but in the former the ventral cirri are even longer than in the latter, and the dorsal cirri have 30 to 40 articles each.

T. alternata was originally described from Alaska and has been reported from the northeast Pacific, south to southern California (Moore, 1923: 256) and from western Mexico (Rioja, 1941: 691). The present specimens are from southwestern Alaska.

Typosyllis elongata (Johnson) new combination

Pionosyllis elongata Johnson, 1901: 403–405, pl. 6, fig. 67–70, pl. 7, fig. 71.

Syllis elongata Berkeley, 1923: 206; Berkeley, 1938: 41; Berkeley, 1942: 190; Rioja, 1941: 688.

Collections. Stations 12–40 (1); 20–40 to 22–40 (1); 24–40 (1); 51–40 (5); 108–40 (4); D 11–41 (1).

This was originally described in the genus *Pionosyllis* because the palpi are partly fused at their bases. Berkeley (1938: 38) has questioned the value of this character and I agree

with her conclusion. Since all setae are composite (or presumably so), and dorsal cirri are articulate, it is herewith referred to *Typosyllis*. Setae are few in parapodia. Anteriorly there are about 12 in a parapodium; the dorsal one to three often lack their appendage, thus resembling simple setae, but this lack is believed to be due to loss through wear. Posteriorly each parapodium has only about six setae, and the dorsal ones similarly lack a distal appendage. In anterior segments the superior setae are slender and have longer appendages than those in the inferior part of the fascicle, or those in median and posterior segments. Their tips are bidentate, with an accessory tooth that is very slender and long; when worn, such setae appear to have an entire tip. The cutting edge has a row of fine spines; the outer side of the shaft has a few fine spines at its thickened portion. True ypsiloid (simple) setae are lacking (see also Berkeley, 1938: 41). In far posterior segments, the setae are similar to those in median segments but more slender. In all setae the articulation tends to be incomplete.

T. elongata differs from *T. alternata* (see above) in that the setal articulation is incomplete in the former, complete in the latter; the appendage of anterior setae is shorter in the first than in the second; the superior seta often resembles an ypsiloid one in the first, whereas it retains its appendage in the second. *T. elongata* was originally described from Washington south to California but has since been reported from various parts of the northeast Pacific (see synonymy above). The present records are from southern Alaska to the Pribilof Islands in the Bering Sea, from shore to 125 fm.

Typosyllis armillaris (Müller)

Nereis armillaris Müller, 1776: 2626.
Syllis armillaris Moore, 1908: 323; Berkeley, 1923: 206.
Syllis (*Typosyllis*) *armillaris* Fauvel, 1923: 264–265, fig. 99.

Collections. Stations 60–40 (5); 61–40 (10); 70–40 (4); L 18–41 (5).

Originally described from Greenland, this species has been reported from cosmopolitan areas, especially in boreal and arctic seas. The present records are from Leonard Harbor in 20 to 25 fm., Cold Bay in 15 to 35 fm., and northwest side of Bare Island, in 13 to 15 fm.

Typosyllis pulchra (Berkeley)

Syllis pulchra Berkeley, 1938: 34–35, fig. 1.
Typosyllis pulchra Hartman, 1944: 250.

Collection. Station 108–40 (3).

This species is pigmented chocolate brown dorsally. Composite setae have entire tips. Originally described from western Canada, it has been found in central California (Hartman, 1944: 250). The present record is Alitak Bay, shore.

Typosyllis stewarti (Berkeley) new combination

Syllis stewarti Berkeley, 1942: 191.

Collection. Station 108–40 (1).

A single large, much-coiled individual has a strongly arched dorsum; it is chocolate brown above, pale below; cirri and antennae are also pale. Antennae and dorsal cirri are short but distinctly moniliform. The median prostomial antenna is inserted far back at the posterior margin of the prostomium. Parapodia are inconspicuous though fleshy; there are about five yellow acicula in each; they terminate distally in a blunt tip. Setae are composite and of a single kind; therefore, the species is considered a *Typosyllis*. The appendage is short and falcigerous; it has a smooth tip and the cutting edge has a few long spines. The uppermost ones resemble those below. Anterior setae resemble those in posterior and median segments but those in the middle of the body are thicker and larger than those elsewhere.

T. stewarti has heretofore been known only through a single individual from Vancouver Island, Canada (Berkeley, 1942); the present record is Alitak Bay, shore.

Typosyllis collaris new species

Fig. 6 *a-c.*

Collection. Station D 8–41 (4).

Several small individuals are colorless except for the four red eyes; the largest one measures 12 mm. long for 45 segments but is posteriorly incomplete. The body is short and plump. The prostomium is broader than long; it has a long median, and two shorter lateral, antennae and the four eyes are in trapezoidal arrangement (Fig. 6 *a*); the posterior portion is somewhat overlain by a nuchal lobe (hence the specific name) which extends forward to the posterior margin of the posterior eyes. The prostomial antennae are articulate, most distinctly so in their distal halves and decreasingly so to near their bases; the median one is more than twice as long as the paired ones (Fig. 6 *a*). The palpi are free from one another except at their bases; they are broadly subrectangular and about as wide as long.

The proboscis terminates distally in 10 soft, widely spaced papillae; on its dorsal side at the anterior end there is a conspicuous semitranslucent greenish tooth, equitriangular in shape. The proportions of prostomial antennae, tentacular cirri, and anterior dorsal cirri are shown in Figure 6 *a.*

The parapodia are short and plump but taper slightly distally. The anterior ones resemble the posterior, except that setae tend to be more numerous in front. Dorsal cirri are articled in their distal halves but are more or less smooth at the base. In anterior parapodia the postsetal lobe is slightly prolonged but the setal lobe is blunt. In median and postmedian parapodia (Fig. 6 *b*) the presetal lobe is somewhat drawn out and shorter than the postsetal one.

Setae are entirely composite and resemble one another throughout. The superior and inferior ones in any fascicle, as also those in anterior and posterior segments, are similar to one another, but the appendage of the first is slightly longer than that in the last. They number 25 to 30 in anterior segments and decrease to 15 to 18 in posterior segments. The shaft is distally spinous; the appendage is short, boldly bidentate at its free end and there are a few long spines along the cutting edge (Fig. 6 *c*). Acicula are pale yellow, slightly knobbed distally, and number usually two in a parapodium.

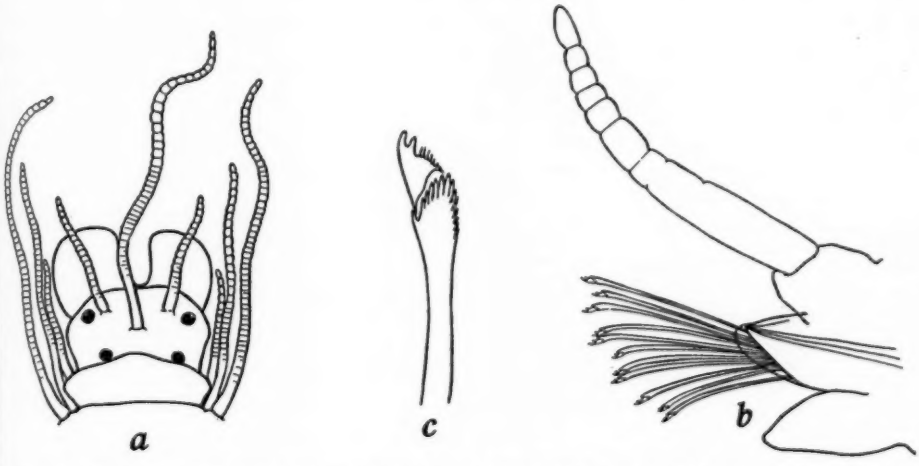

FIG. 6. *Typosyllis collaris* new species: *a*, anterior end in dorsal view, enlarged; *b*, postmedian parapodium in anterior view, only some of the 18 setae shown, × 89; *c*, seta from a median parapodium, × 956.

Anal cirri are long, slender though coiled, and closely articled.

T. collaris is unique among species of the genus *Typosyllis* in having a nuchal collar; tentacular and dorsal cirri are articulate in their distal halves but tend to be smooth at the base; setae have a spinous shaft and a bidentate appendage; ventral cirri are short throughout. In some respects this recalls *Syllis cucullata* McIntosh (1908: 191) from the Isle of Wight, which also has a nuchal collar and short composite setae but in this the setae are distally entire and the nuchal collar is not so wide as in *T. collaris*. Also, the prostomial antennae are much longer. Since setae are presumably entirely composite in *S. cucullata*, it is perhaps also to be referred to the genus *Typosyllis*.

Holotype in the U. S. National Museum.

Type locality. Bering Sea in 42 fm.

Distribution. Alaska.

Genus TRYPANOSYLLIS Claparède

Trypanosyllis gemmipara Johnson

Trypanosyllis gemmipara Johnson, 1901: 405–406, pl. 7, fig. 72–76; Johnson, 1902: 302–315, fig. 7–17; Moore, 1908: 328; Berkeley, 1923: 207; Berkeley, 1938: 42; Berkeley, 1942: 191.

Collection. Station 82–40 (1).

The last 10 or more segments are very short, taper strongly distally, and are immediately preceded, on the ventral side, by a thick cluster of 30 or more buds of varying sizes. This species has been reported from the northeast Pacific. The present record is from near Big Koniuji Island in 25 to 30 fm.

Genus AUTOLYTUS Grube

Autolytus magnus Berkeley

Autolytus magnus Berkeley, 1923: 210, pl. 1, fig. 3, 4; Berkeley, 1938: 47; Berkeley, 1945: 318.

Collection. Station 20–40 to 22–40 (1).

This is a single, atokous, much-coiled individual. The nuchal epaulettes are long, sinuous lappets that extend from the posterior margin of the prostomium and diverge outward, following the inner bases of parapodia; they extend back through the fifth setigerous segment. The prostomium is trapezoidal, widest anteriorly, and longer than wide; it has four red eyes near the ectal margins. The three antennae are thick, long, and wrinkled but not articulated; the median one exceeds the paired ones in length and all are longer than the peristomial cirri. The anterior dorsal cirri are only about half as long as the paired prostomial antennae. Palpi are fused medially and only about half as long as the prostomium when seen from the dorsum.

Parapodial lobes are thick, the setae disposed in close, thick fascicles in anterior and median segments but diminish in number farther back. Anterior parapodia have five or six acicula in each; median parapodia have about four each; they are yellow, taper distally and terminate in acute points. Setae are entirely composite, the shaft distally spinous, the appendage bidentate with strong, secondary tooth.

A. magnus has been described through the Sacconereis (= epitoke female) (Berkeley, 1923) and the Polybostrichus (= epitoke male) (Berkeley, 1938, 1945) stages, both from British Columbia. The present atokous form is from Canoe Bay, in 15 to 40 fm.

Family NEPHTYIDAE

Genus NEPHTYS Cuvier

Nephtys caeca (Fabricius)

Nereis caeca Fabricius, 1780: 304–305.

Nephtys caeca Johnson, 1901: 401–402; Moore, 1908: 341; Berkeley, 1924: 290; Berkeley, 1942: 192.

Collections. Stations 35–40 (1); 51–40 (1); A 61–41 (7); Lazy Bay (10).

Some individuals measure nearly 8 inches long (preserved). Branchiae are not present

before the fifth or sixth segments and the first few pairs are small; the last four or more segments are abranchiate, but the last 10 or more pairs of branchiae are small and papillar. The proboscis has 22 rows of papillae at its distal end; the proximal surface (on the everted proboscis) is covered with low, wartlike elevations.

N. caeca is a cold-water species, common in the northeast Pacific, rarely occurring south to central California (Hartman, 1938: 148). The present collections are from southwestern Alaska, shore to 40 fm.

Family NEREIDAE

Genus NEANTHES Kinberg

Neanthes brandti (Malmgren)

Alitta brandti Malmgren, 1866: 183.

Nereis virens Johnson, 1901: 398, pl. 3, fig. 26–30; Moore, 1908: 344.

Neanthes brandti Hartman, 1944*b*: 252.

Collection. Lazy Bay, off Alitak Bay (5).

This species is distinguished from *N. virens* (Sars) chiefly in the greater dentition of the proboscidial armature. It occurs commonly throughout the northeast Pacific, south to southern California. The present record is within the known range.

Genus CHEILONEREIS Benham

Cheilonereis cyclurus (Harrington)

Nereis cyclurus Harrington, 1897: 210–220, pl. 16, fig. 1–3, pl. 17, fig. 1–7, pl. 18, fig. 1–5; Johnson, 1901: 400, pl. 4, fig. 46, pl. 5, fig. 48–52; Moore, 1908: 343–344; Berkeley, 1924: 292.

Cheilonereis cyclurus Hartman, 1940: 219.

Collection. Station 107–40 (1).

The single individual comes from Alitak Bay, in 30 fm. It has previously been reported from Alaska (see synonymy above).

Genus NEREIS Linnaeus

Nereis procera Ehlers

Nereis procera Ehlers, 1868: 557–559, pl. 23, fig. 2; Johnson, 1901: 400–401, pl. 4, fig. 47, pl. 5, fig. 53–59; Moore, 1908: 343; Berkeley, 1924: 291–292; Berkeley, 1945: 326.

Collection. Station 24–40 (2).

This species has been recorded from various parts of the northeast Pacific. The present collection comes from Canoe Bay, trawled from 125 fm.

Nereis zonata Malmgren

Nereis zonata Malmgren, 1867: 164, pl. 6, fig. 34; Fauvel, 1923: 338–339, fig. 130.

Collection. Station 51–40 (3).

Length of a complete individual is 70 mm. for 73 setigerous segments. In one specimen the body cavity contains large ova. The peristomial tentacles are short, the longest reach back to the anterior end of the first setigerous segment; the shortest are about as long as the prostomial antennae. Parapodial ligules do not change greatly from anterior to posterior regions, but the dorsal portion changes gradually. In postmedian and far posterior segments the differences are most notable; here the dorsal ligule is approximately quadrangular, the insertion of dorsal cirrus carried outward. Still farther back, the length of dorsal and ventral cirri comes to be increasingly great. Anal cirri are tapering and about as long as the last seven setigerous segments.

Homogomph falcigerous notosetae are first present from about the thirty-second segment; they have a long appendage with denticulations on one side. The proboscis is provided with a pair of thick, dark-brown jaws with five blunt teeth on the cutting edge. On the maxillary ring, area I has two small cones in tandem; area II has about 24 larger and smaller cones in irregular crescentic arrangement; area III has about 20 larger and smaller cones in an oval

patch; area IV has about 25 cones in a crescent, the largest ones on the side toward area III. On the oral ring, area V has none, area VI has seven or eight small circular cones; areas VII and VIII (continuous) have seven larger pointed cones in a row on the maxillary side and about six to eight irregular rows of many tiny cones; those on the oral side are gradually smaller. The largest cones are on areas II and IV and those on the maxillary side of VII.

The proportions of dorsal ligule to other parts of the parapodium, especially in far posterior parapodia, differ somewhat from those described (Malmgren, 1867) for individuals from the type locality, in that in the present case the dorsal ligule is relatively larger, but in other respects there is agreement.

Originally described from Greenland, this species has been reported from both sides of the Atlantic. The present record is Canoe Bay, 25 to 40 fm.

Nereis vexillosa Grube

Nereis vexillosa Grube, 1851: 4–6, pl. 2, fig. 1, 5, 6; Johnson, 1901: 399, pl. 3, fig. 31, 32, pl. 4, fig. 33–38; Berkeley, 1924: 290–291.

Collections. Stations 3–40 (18); 47–40 (3); 108–40 (4); Dolgai Harbor (5); Lazy Bay, off Alitak Bay (2); head of Lazy Bay (10).

This species is well known in the north Pacific, from Alaska south to central California. The present records are from shore stations in southwestern Alaska.

Nereis pelagica Linnaeus

Nereis pelagica Linnaeus, 1761: 508; Moore, 1908: 342; Fauvel, 1923: 336–337, fig. 130; Berkeley, 1924: 291; Berkeley, 1942: 192.

Collections. Stations 12–40 (7); 31–40 (2); 33–40 (4); 34–40 (1); 51–40 (12); 52–40 (1); 61–40 (2); 70–40 (1); 108–40 (3); 128–40 (1); C 5–41 (2); D 15–41 (3); Mitrofania Bay (2 male epitokes).

This species is apparently common throughout littoral areas of the northeast Pacific. In some individuals the parapodial ligules are opaque white, in others fuscous to dusky black, as typical for *N. neonigripes* Hartman (1936). In all, however, the proboscidial parts are much alike and the proportions of parapodia are similar. Homogomph falcigerous notosetae are present from a premedian segment and are continued posteriorly to the end. In the two male epitokous individuals from Mitrofania Bay, there are only 16, instead of 17, anterior setigerous segments, and natatory parapodia are continued posteriorly to the end. I am now inclined to regard *N. neonigripes* Hartman (1936*b*: 471–472) from California as a variety of *N. pelagica,* if not merely a color phase. In living individuals the dark parapodial ligules of the latter are striking but they tend to fade out in fixed specimens.

N. pelagica has been widely reported from all seas.

Nereis neoneanthes new species

Fig. 7 *a-d.*

Collections. Station C 150–41 (1), western Oregon (1).

A single incomplete individual was removed from within a sabellid tube; it is over 100 mm. long but the body is soft and slightly macerated. There are over 131 segments; the body is long and slender. The prostomium has four circular, embedded eyes in the usual arrangement. The paired palpi have long bases that project forward beyond the paired antennae; their palpodes are subspherical. The peristomial tentacles are short, simple, and tapering; the longest reaches back to about the third setigerous segment, the shortest is almost twice as long as a prostomial antenna. The peristomial ring is nearly twice as long as the first setigerous ring.

The proboscis is unique in having many paragnaths. The oral ring has many rounded paragnaths, all similar in appearance but those on the maxillary side increase in size gradually. The paragnaths cover most of the oral ring of areas VII and VIII and are only slightly separated by a narrow space from those of paired

areas VI. Each area VI has six or eight similar cones, and area V has three slightly larger cones than those on area VI. The largest paragnaths of the oral ring are those on the maxillary side of area VI. On the maxillary ring, area I has a single small cone, area II has a narrow crescent of four or five small cones; III has an oval patch of about 18 cones, including four larger ones on the oral side and others of varying sizes; the largest are about equal to those on the maxillary side of area VII; area IV has a crescent of about 14 in approximately two rows intermediate in size between those of III and II. Jaws are translucent, dark, horny, brown, and thick; there are 12 short, crenulate, slightly oblique teeth along the cutting edge.

The first and second parapodia are uniacicular and uniramous as typical of the genus. From the third, slender dark acicula occur singly in each lobe and are continued so throughout. Anterior parapodia have nearly equal dorsal, middle, and ventral ligules; there is no ligule in the notoacicular portion; the neuroacicular lobe is shorter than the parapodial ligules; the dorsal cirrus is inserted at the base of the dorsal ligule and extends distally about as far; the ventral cirrus is shorter than the ventral lobe.

Parapodial ligules change little proceeding back except for the dorsal one; already in the anterior third of the body it increases in width, surpassing the others in size and by the middle it extends distally beyond the others. The insertion of the dorsal cirrus is gradually outward and comes to be about midway on the dorsal ligule (Fig. 7 *a*).

Setae are of the usual kind. Notopodia are provided with only homogomph spinigers in anterior segments; from about segment 40 there are one or two homogomph falcigers (Fig. 7 *c*) accompanying the spinigers and they finally replace the latter. At their greatest development the falcigers number five or six in median segments, but the number decreases further back. Under low magnification these hooks appear dusky. Neuropodia are provided with homogomph spinigers superiorly, and with heterogomph falcigers (Fig. 7 *b*) and heterogomph spinigers below the aciculum.

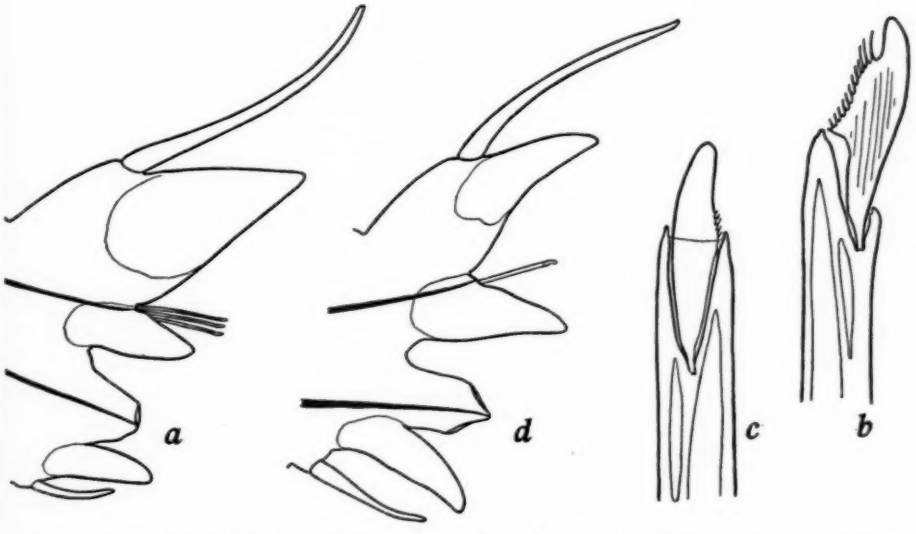

FIG. 7. *Nereis neoneanthes* new species (*a–c* from station C 150–41, *d* from Oregon): *a*, postmedian parapodium, × 44; *b*, neuropodial falcigerous hook from same parapodium, × 700; *c*, notopodial falcigerous hook from same parapodium, × 700; *d*, far posterior parapodium, × 88.

A more complete, well-preserved individual is in the collections of the Allan Hancock Foundation and comes from 35 miles west of Depoe Bay, Oregon, dredged in 60 to 74 fm. This is 100 mm. long and has over 225 segments. The body is similarly long and slender, and tapers posteriorly. No color remains except for small, paired brown spots dorsally, at the sides, within the parapodial bases. The parapodial ligules are opaque white. The everted proboscis has about the same paragnathal formula as that described for the individual from Moffet Point. Notopodial falcigers are first present from segment 46. A far posterior parapodium is shown in Figure 7 *d*.

N. neoneanthes is characterized in having paragnaths on all areas of the proboscis, those of areas VII and VIII are most numerous; parapodia change posteriorly such that the dorsal ligule comes to be broad and long, carrying the dorsal cirrus to about midway its length. Acicula are black and occur singly in parapodial lobes; homogomph falcigers have a short appendage with blunt tooth distally and fine teeth on the cutting edge. The body form is long and slender. In the last-named respect *N. neoneanthes* resembles *N. procera* Ehlers, but the two differ in their proboscidial arrangement and parapodial parts. In its high paragnathal count, it approaches *N. eakini* Hartman, but the latter has different parapodial parts.

Holotype in the U. S. National Museum.

Type locality. Off Moffet Point, Alaska, in 60 fm.

Distribution. Alaska and Oregon, in 60 to 74 fm.

Genus PLATYNEREIS Kinberg

Platynereis agassizi (Ehlers)

Nereis agassizi Ehlers, 1868: 542–546, pl. 23, fig. 1; Johnson, 1901: 399–400, pl. 4, fig. 39–45; Berkeley, 1924: 292.

Platynereis agassizi Moore, 1908: 344.

Platynereis dumerilii agassizi Berkeley, 1942: 192.

Collections. Stations 27–40 (1); 33–40 (3); 97–40 (1); 129–40 (2); L 11–41 (4); L 20–41 (15).

The individuals here recorded are smaller than those typical for central California, approximating only one-half to two-thirds the size of the latter. *P. agassizi* has been widely reported from parts of the northeast Pacific. The present records are from southwestern Alaska, in 14 to 48 fm.

Family GLYCERIDAE

Genus GLYCERA Savigny

Glycera capitata Oersted

Glycera capitata Oersted, 1843: 196–198, fig. 87–88, 90–94, 96, 99; Berkeley, 1927*a*: 411; Berkeley, 1942: 193.

Collections. Stations 33–40 (1); 34–40 (2); 51–40 (3); A 61–40 (1); CT 12–41 (1); D 3–41 (1); Lazy Bay (1); Seldovia (1).

Originally known from Greenland, this species has since been reported from arctic and boreal seas. The present records are from southwestern Alaska, in 17 to 150 fm.

Genus HEMIPODUS Quatrefages

Hemipodus borealis Johnson

Hemipodus borealis Johnson, 1901: 411–412, pl. 10, fig. 104; Hartman, 1940: 244, pl. 43, fig. 121.

Collections. Crab Bay, summer 1932, collected by E. F. Ricketts (1); Sitka, August 1932, collected by E. F. Ricketts (2).

The ringed prostomium and uniramous parapodia characterize this as a *Hemipodus*. It is the only known representative of the genus from Alaska. Its range is southward to western Mexico, in littoral sandy zones.

Genus GLYCINDE F. Müller

Glycinde picta Berkeley

Glycinde picta Berkeley, 1927*a*: 412; Berkeley, 1942: 194.

Collections. Stations 35–40 (2 anterior fragments); 97–40 (1).

The parapodial change, from uniramous to biramous condition, occurs at the twenty-ninth segment in all individuals, instead of the twenty-fifth to twenty-seventh segment, as described by Berkeley (1927*a*: 412). Where notopodia are developed they have an elongate dorsal cirrus and a broadly rounded presetal lamella. They are provided with five or six yellow, simple, hooded hooks. Neuropodia have a dorsal, triangular postsetal lobe and a longer, though similar, presetal lobe throughout the length of the body; the presetal lobe is the longer. Neurosetae are composite spinigers with heterogomph articulation. The prostomium has two eyes on the basal ring and two less distinct spots on the distal ring. The proboscis is provided distally with two large, dentate jaw pieces on the dorsal side, and a circlet of many tiny, quadricuspidate pieces laterally and ventrally.

This species is known only from British Columbia and Alaska. The stations here recorded are southwestern Alaska, in 18 to 30 fm.

Family LUMBRINERIDAE

Genus LUMBRINERIS Blainville

Lumbrineris bicirrata Treadwell

Lumbrinereis bicirrata Treadwell, 1929: 1–3, fig. 1, 2.

Lumbrineris bicirrata Hartman, 1944: 156.

Collections. Stations 52–40 (1); 59–40 (2).

The original collection came from Friday Harbor, Washington; present records are from Canoe Bay in 40 fm., and between Inner Iliasik and Goloi Island, in 20 to 30 fm.

Lumbrineris latreilli Audouin and Edwards

Lumbrineris latreilli Audouin and Edwards, 1833: 242–244; Berkeley, 1942: 195; Hartman, 1944: 158.

Lumbriconereis latreilli Fauvel, 1923: 431–432, fig. 171.

Collections. Station 12–40 (1); 108–40 (4); L 18–41 (1).

This species is cosmopolitan in distribution. The present records are from southwestern Alaska, from shore to 15 fm.

Lumbrineris zonata (Johnson)

Lumbriconereis zonata Johnson, 1901: 408–409, pl. 9, fig. 93–100.

Lumbrineris zonata Hartman, 1944: 146–147 (with synonymy).

Collection. Sitka, August 1932, collected by E. F. Ricketts (1).

This species was originally described from Washington but has since been recorded from other parts of the northeast Pacific to Lower California. The present record is the most northern one.

Family ARABELLIDAE

Genus DRILONEREIS Claparède

Drilonereis nuda Moore

Drilonereis nuda Moore, 1909: 254–256, pl. 8, fig. 21–23; Hartman, 1944: 178–179, pl. 13, fig. 297–302 (with synonymy).

Collection. Sitka, August, 1932, collected by E. F. Ricketts (1).

Previously recorded from central California, south to Panama, this marks the most northern record for the species and genus.

Family DORVILLEIDAE

Genus DORVILLEA Parfitt

Dorvillea pseudorubrovittata Berkeley

Dorvillea pseudorubrovittata Berkeley, 1927*a*: 409–410; Hartman, 1944: 189.

Collection. Station 70–40 (4).

The articulation and proportion of palpi and antennae agree well with those in the original description. The species is known only through the original account from British Columbia (Berkeley, 1927*a*); the present individuals are from Cold Bay, in 15 to 35 fm.

Family ORBINIIDAE

Genus HAPLOSCOLOPLOS Monro

Key to Species of *Haploscoloplos*

1. Subpodal lobe (Fig. 8 *b*) present..... .....*H. alaskensis*
1. Subpodal lobe absent..... 2
2. Thorax consists of 20 segments; branchiae present from sixteenth segment; thoracic postsetal lobe short, papillar .....*H. elongata*
2. Thorax consists of 14 segments; branchiae present from eleventh segment; thoracic postsetal lobe long (Fig. 8 *e*) ..... *H.* sp.

Haploscoloplos elongata (Johnson)

Scoloplos elongata Johnson, 1901: 412–413, pl. 10, fig. 105–110; Berkeley, 1927*a*: 413.
Haploscoloplos elongata Hartman, 1944*b*: 257.

Collection. 59–40 (3).

Thoracic neuropodia are provided with only pointed setae; acicular spines and subuluncini are absent; this is therefore referred to *Haploscoloplos.* Specific characters include the following. The prostomium is pointed, triangular. Branchiae are first present from the sixteenth setigerous segment; they are small through three to five segments, but broad and laterally fimbriated farther back. The thorax consists of 20 setigerous segments in which the last one is transitional. Thoracic notopodia and neuropodia have a short, simple, postsetal lobe at the mid-length of their ridges; at first they resemble papillae but by the transitional segment they are larger and triangular.

Subpodal lobes, ventral cirri, and intercirri are absent. Setae are long, pointed, and spinous along their free length; those in thorax and abdomen, in notopodia and neuropodia, resemble one another except for their relative thicknesses and lengths. In addition, three to five furcate setae occur in abdominal notopodia, accompanying the pointed ones.

The dorsum, between the bases of the larger branchiae, is marked with a reticulated pigment pattern that persists in alcohol. The branchial tips and the broad neuropodial flanges have a punctate dark pigment. It is this pigmented feature, together with the similarity of the proboscis, that first prompted the identity of these individuals with Johnson's description of the species. In other respects there is likewise agreement, but the original description is lacking in important details.

Scoloplos acmeceps Chamberlin (1919: 15), from California, is another species since it has acicular spines in thoracic neuropodia; it is a true *Scoloplos* Blainville.

H. elongata was originally recorded from Puget Sound, Washington; the present individuals come from between Inner Iliasik and Goloi Island, in 20 to 30 fm.

Haploscoloplos alaskensis new species

Fig. 8 *a-c.*

Collections. Stations 35–40 (1); 60–40 (1); Lazy Bay (6).

One individual, posteriorly incomplete, measures 30 mm. long for 146 segments. No color remains (preserved). The prostomium is anteriorly pointed, equitriangular and conical, or only slightly depressed; there are no visible eyespots. The first segment is achaetous and apodous. The thorax includes the first 16 setigerous segments; dense fascicles of pointed setae occur in both notopodia and neuropodia. The seventeenth segment marks the beginning of the abdominal region; neuropodial lobes are longer and slenderer than those in front, and the setae are disposed in prolonged slender tufts.

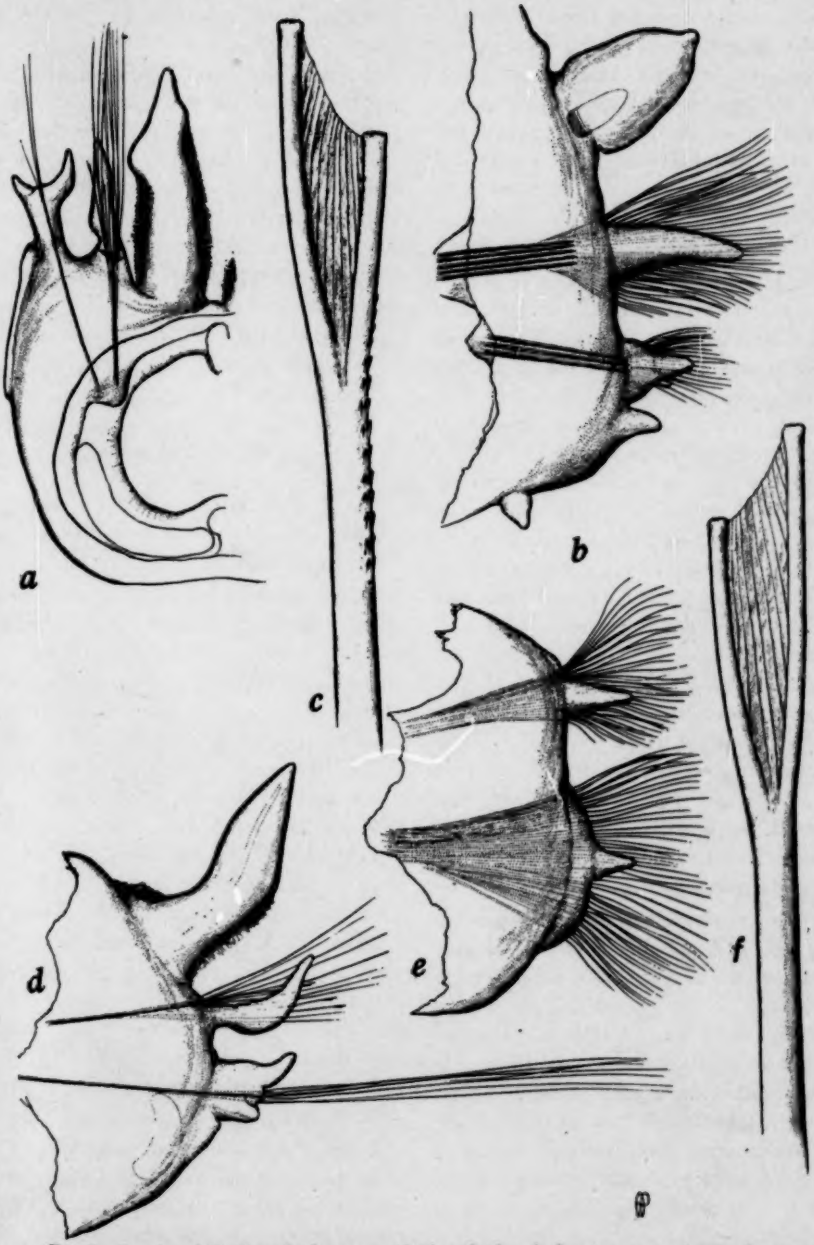

FIG. 8. Species of *Haploscoloplos*. *a–c, Haploscoloplos alaskensis* new species: *a*, far posterior parapodium in anterior view, × 90; *b*, seventeenth parapodium in posterior view, × 140; *c*, furcate notopodial seta, × 3950. *d–f, Haploscoloplos* sp. (Greenland): *d*, fiftieth parapodium in posterior view, × 156; *e*, tenth parapodium in posterior view, × 156; *f*, furcate notopodial seta, × 3950.

Branchiae are first present from the eleventh or twelfth setigerous segment; the first are very small but they elongate and widen rapidly through six segments and come to be large at the beginning of the abdominal region. Preserved, many branchiae lack fringe at their outer margins, but a few retain a delicate, close pubescence that extends distally to a subterminal enlargement (Fig. 8 *a*).

In the first 14 segments parapodia have an elongate, triangular postsetal lobe along the midlength of both notosetal and neurosetal ridges. These lobes increase in size gradually through the thoracic region. From the thirteenth setigerous segment another small lobe, resembling a ventral cirrus, makes its appearance; it is at the lower edge of the neurosetal ridge; it increases in size through four segments, to the sixteenth one and is continued back to the twenty-second parapodium, where it merges with the superior part of a broad parapodial flange. At the sixteenth setigerous segment a subpodal lobe (Fig. 8 *b*), located some distance below the lower podal one, makes its appearance. It is usually simple, rarely bifid. This subpodal lobe moves gradually more ventrally in position; it is continued into the anterior abdominal region, through the twenty-third parapodium, but is absent thereafter. Intercirri are absent. Abdominal parapodia have the proportions shown in Figure 8 *a*.

Setae are numerous in thoracic segments; those in neuropodia are the denser and disposed in transverse series; notopodial setae form a tuft. All taper to fine points and are spinous along their free length. Abdominal setae are similar but fewer in number and slenderer than those in front. Furcate setae (Fig. 8 *c*) are present in notopodia. Acicula are pale yellow, straight and slender; they terminate distally in a point; in abdominal segments they number three or four in neuropodia and five or six in notopodia.

H. alaskensis is characterized in having 16 thoracic setigerous segments. Branchiae are present from the eleventh or twelfth segment and continued posteriorly to or near the end. Podal lobes, resembling ventral cirri, occur on parapodial segments 15 to 22. Subpodal lobes, widely separated from the podal lobes, are on parapodal segments 16 to 23. Among the several species of *Haploscoloplos*, only one, *H. panamensis* Monro (1933: 1045) from Pacific Panama, has subpodal lobes, but in it they are not continued into the abdominal region and they have a position proximal to the podal lobe, not widely removed from it, as in *H. alaskensis*.

Holotype in the U. S. National Museum.

Type locality. Lazy Bay, Alaska.

Distribution. Southern Alaska.

Haploscoloplos sp.

Fig. 8 *d-f*.

Collection. Murchison Sound, Greenland, in 60 fm., coll. Capt. R. A. Bartlett (1–).

One incomplete individual in the collections of the National Museum, though not from Alaska, seems worth recording since it also comes from a far northern locality (Greenland). It may represent an undescribed species, but the material is too imperfect to ascribe a specific name. It consists of 50 anterior segments and measures 16 mm. long; greatest width in the thorax is about 1.5 mm. The prostomium is acutely pointed in the front, somewhat depressed and longer than wide; it lacks eyespots. Branchiae are first present in the thorax, from the eleventh setigerous segment; they are very small at first but increase in size gradually so that by the first abdominal segment they are larger than the postsetal lobes. The transition from thorax to abdomen is at the fifteenth setigerous segment, where neuropodia change character abruptly, from ridges to tufts.

Thoracic and abdominal parapodia are provided with only simple, pointed setae throughout. Embedded acicula are slender, yellow, and few in number. Furcate setae (Fig. 8 *f*) occur with pointed setae in abdominal notopodia; they have a smooth stalk. Thoracic setae are in full spreading fascicles, densest in neuropodia.

They are bounded behind by a low fleshy ridge, from which a long, slender lobe arises at about the mid-length of the ridge (Fig. 8 *e*).

Abdominal notopodia have a long, simple, postsetal lobe. Neuropodia have a longer, presetal process and a shorter, postsetal (or slightly ventral) one (Fig. 8 *d*). There are no ventral cirri but a short flange (or ridge) is present at the lower end of neuropodia. Intercirri, podal and subpodal lobes are lacking.

This specimen differs from other species of the genus most noticeably in the slenderness of its thoracic postsetal lobes, and abdominal notosetal process, also the bilobed neuropodial process (Fig. 8 *d*).

This represents the first record of a *Haploscoloplos* from Greenland.

Family PARAONIDAE

Genus ARICIDEA Webster

Aricidea heteroseta new species
Fig. 9 *a-d.*

Collection. Lazy Bay (2).

A slender, threadlike though much-coiled individual measures not over 25 mm. long and about 1 mm. wide; it consists of 110 segments (posteriorly incomplete). The prostomium is flat, depressed, trapezoidal in shape and about as long as wide; the greatest width is behind the insertion of the median antenna. At its anterior end it is broadly rounded but when seen from the ventral side it appears slightly incised medially. The dorsal surface is plain except for the attachment of antennae, and the slightly crescentic nuchal slits near the posterior portion (Fig. 9 *a*). The median antenna is smooth and tapering; it extends back to the middle of the first segment.

Branchiae are present from the fourth to thirty-fourth setigerous segment; they number 30 pairs. They are abruptly absent thereafter. The first are already large but they increase in size gradually so that the two of a pair overlap medially. They are broad and straplike; they taper to a point distally and are fimbriated at their lateral margins but the tip is smooth (Fig. 9 *b*).

Parapodia have a prolonged, postsetal, notopodial lobe; this is small at first but increases in size through the anterior branchial region and diminishes thereafter. In the anterior branchial region it is broad, auricular, and has the proportions shown in Figure 9 *b;* it gradually diminishes in width in the posterior branchial segments so that it comes to be slender, cirriform, and is continued so to the end of the pieces. Setal lobes are most conspicuous in the

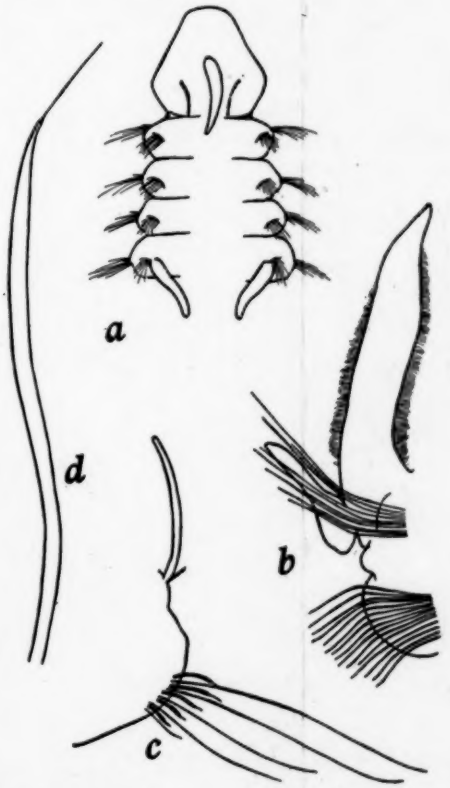

FIG. 9. *Aricidea heteroseta* new species: *a*, anterior end in dorsal view, × 34; *b*, ninth parapodium in anterior view, × 119; *c*, far posterior parapodium, × 119; *d*, acicular neuroseta from the same parapodium, × 652.

MAP I. Locality map of southwestern Alaska showing most of the area in w

e area in which collections were made by the Alaska King Crab Investigation.

first 18 segments and diminish in size and fullness thereafter. Neuropodia are larger and fuller than notopodia throughout. In anterior segments both branches of parapodia are provided with only tapering, pointed setae, those in neuropodia thicker and shorter (Fig. 9 *b*). In the postbranchial region, notopodia come to be very inconspicuous and are provided with only a few slender setae, but their postsetal lobes continue long and slender (Fig. 9 *c*). In postbranchial neuropodia, setae consist of two kinds arranged in a single transverse series; they include a few long, slender setae, longest superiorly, which alternate with thicker, shorter, acicular setae with a distal arista (Fig. 9 *d*). The posterior end is unknown.

A. heteroseta is characterized in having a simple prostomial lobe in which the median antenna is short; branchiae are present from the fourth to thirty-fourth segments and number 30 pairs; anterior branchial segments have an auricular postsetal, notopodial lobe; posterior neuropodia are provided with two kinds of setae including long, slender, and shorter, acicular ones with an arista. The specific name refers to the last named character.

Holotype in the U. S. National Museum.

Type locality. Lazy Bay, Alaska.

Distribution. Southern Alaska.

Family SPIONIDAE

Genus LAONICE Malmgren

Laonice cirrata (Sars)

Nerine cirrata Sars, 1851: 207.

Laonice cirrata Fauvel, 1927: 38, fig. 12; Berkeley, 1936: 474; Berkeley, 1942: 196.

Collection. Station 139–40 (1).

This species has been recorded from areas in the northern Pacific. The present locality is off Hallo Bay, in 28 to 40 fm.

Genus SPIO Fabricius

Spio filicornis (Müller)

Nereis filicornis Müller, 1776: 218.

Spio minus Chamberlin, 1920: 16B, pl. 3, fig. 1–4; Hartman, 1938*a*: 13.

Spio filicornis Fauvel, 1927: 43–44, fig. 15.

Spio filicornis pacifica Berkeley, 1936: 475–476.

Collection. Lazy Bay (3 anterior ends).

No color remains. The prostomium is anteriorly truncate, with rounded margins and not narrowed forward. Hooded crotchets are first present from the seventeenth setigerous segment. The variety *pacifica* Berkeley (1936: 475) appears to be the same, since it is said to differ in color only.

This species was first described from Greenland but has been reported from many geographic regions. The present lot is from southwestern Alaska, intertidal.

Genus PRIONOSPIO Malmgren

Prionospio malmgreni Claparède

Prionospio malmgreni Claparède, 1879: 73–76, pl. 22, fig. 3; Fauvel, 1927: 61–62, fig. 21; Berkeley, 1927*a*: 414.

Collection. Station 72–40 (1).

The posterior eyes are large, not small; in other respects this individual agrees with the descriptions.

This species has been reported from British Columbia (Berkeley, 1927*a*); the present collection is from Cold Bay, in 15 to 50 fm.

Genus POLYDORA Bosc

Polydora giardi Mesnil

Polydora giardi Mesnil, 1896: 195, pl. 13, fig. 1–12; Fauvel, 1927: 50–51, fig. 17; Hartman, 1941: 309, pl. 48, fig. 3; Rioja, 1941: 727.

Collections. Stations 20–40 to 22–40 (4+); 26–40 (many, in shell fragments); 61–40 (many, in shell fragments); L 18–41 (1).

The range is hereby extended in the Pacific, from Mexico and central California to southwestern Alaska, in 13 to 100 fm.

Polydora socialis (Schmarda)

Leucodore socialis Schmarda, 1861: 64, pl. 27, fig. 209.

Polydora socialis Hartman, 1941: 290, 310, pl. 48, fig. 41, 42.

Collection. Station L 18–41 (1).

The single individual is posteriorly incomplete. The dorsum is marked with paired dark spots. The prostomium is distinctly bifid at its anterior end and has four tiny eyespots in trapezoidal arrangement. The nuchal ridge extends back through 11 setigerous segments and lacks a median papilla. Dorsal lamellae of the first setigerous segment are conspicuous and exceed in size those farther back. The first segment has both notosetae and neurosetae. Branchiae are first present from the eighth segment and continued posteriorly through a long region.

Originally described from Chile, this species has since been reported from southern California. The present record is far to the north, in Kupreanof Strait, 2 miles northwest of Bare Island, in 13 to 15 fm.

Family CHAETOPTERIDAE

? Chaetopterus sp.

Collection. Station C 5–41 (empty tubes).

Several empty tubes, recalling those of the cosmopolitan species, *Chaetopterus variopedatus* Renier, come from Icy Straits, east end of Pleasant Island, in 7 fm.

Family CIRRATULIDAE

Genus CIRRATULUS Lamarck

Cirratulus cirratus (Müller)

Lumbricus cirratus Müller, 1776: 214.

Cirratulus cirratus Fauvel, 1927: 94, fig. 33.

Cirratulus cingulatus Johnson, 1901: 422–423, pl. 14, fig. 145–148; Berkeley, 1942: 197.

Collections. Stations 61–40 (2); 108–40 (2).

This species is known from the northern Pacific (see synonymy above). The present records are from Cold Bay, in 15 to 30 fm., and Alitak Bay, shore.

Genus THARYX Webster and Benedict

Tharyx hamatus new species

Fig. 10, *a-e.*

Collection. Station 108–40 (2).

The larger one measures about 12 mm. long for over 100 segments. Both individuals are dark slate-colored, but the prostomium and tentacles are pale. The body rings are short and closely crowded. The prostomium is approximately equitriangular in shape and somewhat depressed conical; it lacks visible eyespots. Nuchal organs are present but not conspicuous (Fig. 10 *a*). The peristomium or anterior apodous region (since it probably consists of three coalesced segments) is three to four times as long as, and much thicker than, the prostomium. The paired palpi are thick; each has a longitudinal groove, and is inserted dorsolaterally so that the palpal bases are not quite touching each other.

The lateral tentacles are most numerous in the anterior region but continued on some segments in a posterior region. They originate immediately above the notopodial ridge throughout. Parapodia are reduced to mere ridges. Setae in the anterior region are pointed and slender; they extend laterally for a distance equaling about half the width of the body at their origin. Hooks are present in neuropodia already before the middle of the body, but in notopodia not until thereafter. In the posterior fourth of the body the neuropodia are provided with only hooks, numbering six to eight in a single transverse series (Fig. 10 *b*); the corresponding notopodia have both pointed setae (Fig. 10 *e*) and similar hooks, alternating with one another, together equaling eight to

ten. All hooks are clearly bidentate at their distal end, the notopodial (Fig. 10 *d*) somewhat finer than the neuropodial (Fig. 10 *c*) ones. The tube is fragile, dark, and cindery; it is irregular in shape and occupies crevices of serpulid tubes.

T. hamatus is characterized in having some segments with both notopodia and neuropodia provided with bidentate hooks; tentacular cirri originate immediately above the notopodial ridge. Three other species of *Tharyx* have been described from the northern Pacific region; they are *T. multifilis* Moore (1909: 267) and *T. gracilis* Moore (1923: 187) from California, and *T. parvus* Berkeley (1929: 307) from British Columbia. The first and third of these species have only pointed setae in notopodia and neuropodia; *T. gracilis* has pointed setae in notopodia and blunt spines in neuropodia. *T. hamatus* differs from all of these most clearly in that parapodia have bidentate hooks in some segments.

Holotype in the U. S. National Museum.
Type locality. Alitak Bay, Alaska, shore.
Distribution. Alaska.

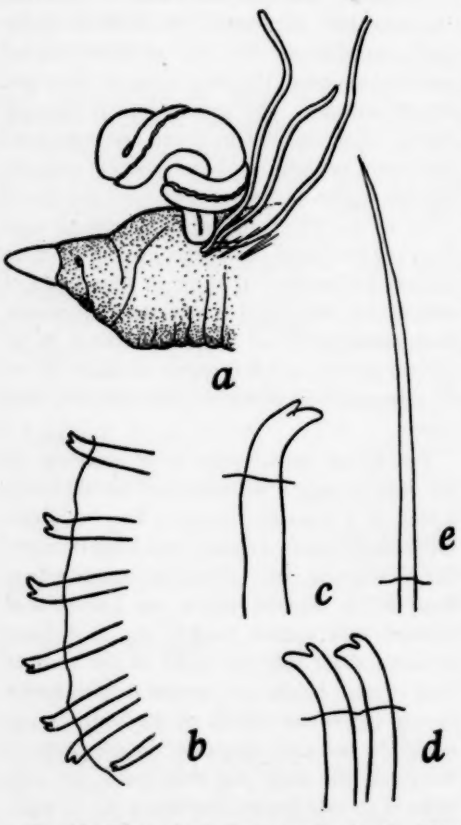

FIG. 10. *Tharyx hamatus* new species (station 108–40): *a*, anterior end in left lateral view, × 35; *b*, posterior neuropodium showing distal ends of neurosetae, × 105; *c*, neuroseta from the same parapodium, × 1125; *d*, two notosetae from the same parapodium, × 1125; *e*, distal end of a pointed notoseta, × 1125.

Genus ACROCIRRUS Grube

This is a small genus, characterized by the presence of composite neuropodial hooks. The anterior end is provided with a pair of thick, grooved palpi and a few pairs of tentacular cirri. Notopodial setae are simple, slender, and distally pointed. Color of the body is usually dark.

Seven species have been described in the genus; five originate in the north Pacific. They are (1) *A. crassifilis* (Moore, 1923: 188) from southern California, (2) *A. heterochaetus* Annenkova (1934: 326) from Bering and Japan seas, (3) *A. muroranensis* Okuda (1934: 202) from Japan, (4) *A. uchidai* Okuda (1934: 197) from Japan, and (5) *A. validus* Marenzeller (1879: 148) from Japan. Among these, only one, *A. heterochaetus*, is known to have the eleventh segment modified and provided with heavy, simple hooks; it agrees therein with the type of the genus, *A. frontifilis* Grube (see Fauvel, 1927: 104) from the Mediterranean Sea.

Acrocirrus heterochaetus Annenkova

Fig. 11, *a-c*.

Acrocirrus heterochaetus Annenkova, 1934: 326–327, fig. 7 [in Russian].

Collections. 20–40 to 22–40 (1); 24–40 (1).

The color (preserved) is dark slaty brown; there is no pigment pattern. The prostomium is

short and terminates at its anterior end in a short palpode medially; it has a pair of dark eyespots dorsally. The palpi are thick and their bases occupy much of the frontal region. The tentacular cirri are similarly thick, few in number, and inserted on a short anterior region. Notopodial tufts are first present from the second setigerous segment. The eleventh segment is modified and about twice as long as the segments proximal to it; its notopodial tuft is normal, but its neuropodia are modified and each is provided with a single heavy, simple, yellow hook (Fig. 11 *b*) (in one case two hooks are present). These hooks are much like the shafts of the composite hooks except that they are much thicker. This modified segment seems to be a device used in tube construction or anchorage within the tube.

Parapodial ridges have transverse series of small papillae that are continued only slightly beyond the parapodial bases. Notopodial tufts are similar to one another throughout; usually each has about six slender, pointed setae. The latter have close transverse rows of fine spines along the free length (Fig. 11 *c*). Neuropodia, except in the eleventh setigerous segment, are provided with only composite hooks; they have a falcate appendage that terminates distally in a single strong tooth and a delicate sheath (Fig. 11 *a*); the appendage and shaft are not completely separated at the articulation.

A. heterochaetus was known only through its original description, based on individuals from Bering and Japan seas, from sublittoral zones to 74 meters. The present records are from Canoe Bay, in 15 to 40 fm.

Family ARENICOLIDAE

Genus ARENICOLA Lamarck

Arenicola pusilla Quatrefages

Arenicola pusilla Quatrefages, 1865: 266; Ashworth, 1912: 114–123, pl. 7, fig. 15, pl. 8, fig. 18, pl. 10, fig. 12–25, pl. 13, fig. 44, pl. 14, fig. 49; Berkeley, 1932*a*: 315; Berkeley, 1942: 198.

Collections. Lazy Bay (25); head of Lazy Bay (1).

This species has been reported from Alaskan waters; the present records are from southwestern Alaska, intertidal.

Family OPHELIIDAE

Genus ARMANDIA Filippi

Armandia bioculata Hartman

Armandia bioculata Hartman, 1938*e*: 105–106, fig. 51–54.

Collections. Stations 47–40 (5); 51–40 (5).

The body consists of 29 or 30 setigerous segments. Branchiae are present from the second segment to the penultimate (or rarely last) segment, numbering 28 (or 29) pairs. The prostomium is broadly rounded anteriorly and terminates in a small palpode. Nuchal organs are more or less conspicuous, and partly everted in some individuals. Two dark eyespots, one above the other, are deeply embedded in the tissue of the prostomial lobe.

Lateral eyespots are dark brown, present from segments 7/8 to 17/18 and number 11 pairs. They vary in size and shape among themselves; most are large and circular, others are mere specks, a few are somewhat oval. Branchiae are long and cirriform; the first and last pairs are smaller than the others. Parapodia are simple, rounded, with a tiny postsetal lamella in neuropodia. The pygidium terminates on its ventral side in a pair of longer cirri, and laterally in four or five similar, though smaller, cirri; a median unpaired filament projects for a longer or shorter distance from within the pygidial funnel.

These indivdiuals are referred to *A. bioculata* largely because of the nature of pygidial structures and the distribution of branchiae. *A. brevis* (Moore) (1906: 354), from Icy Cape, Alaska, differs in that the pygidium, which was presumably perfect, was described without terminal

cirri; the lateral eyespots were described as conspicuous, hemispherical in shape, and indistinctly faceted, with some small black or dark brown ones.

The range of *A. bioculata,* originally described from California, is thus extended to Canoe Bay, Alaska, shore to 40 fm.

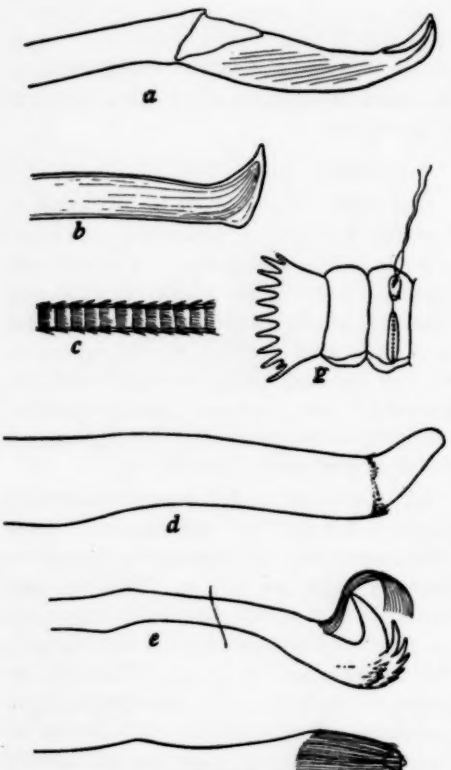

FIG. 11. Species of *Acrocirrus* and *Nicomache*. *a–c, Acrocirrus heterochaetus* (station 24–40): *a,* one of four neurosetal hooks from a median region, × 338; *b,* heavy hook from the modified eleventh setigerous segment, × 102; *c,* portion of one of six notosetae showing the spinous character, × 850. *d–g, Nicomache personata* (Lazy Bay): *d,* heavy acicular hook from the fourth setigerous segment, × 335; *e,* rostrate uncinus from a postmedian neuropodium, × 335; *f,* same, in frontal view, × 335; *g,* posterior end in right lateral view, × 12.

Family SCALIBREGMIDAE

Genus SCALIBREGMA Rathke

Scalibregma inflatum Rathke

Scalibregma inflatum Rathke, 1843: 184–186, pl. 9, fig. 15–21; Moore, 1908: 336; Chamberlin, 1919: 392; Fauvel, 1927: 123–124, fig. 44; Berkeley, 1930: 68.

Collection. Station 59–40 (1).

This species has been reported from both sides of North America; the present record is from between Inner Iliasik and Goloi Island, in 20 to 30 fm.

Family FLABELLIGERIDAE

Genus FLABELLIGERA Sars

Flabelligera infundibularis Johnson

Flabelligera infundibularis Johnson, 1901: 417, pl. 12, fig. 124–127; Chamberlin, 1919: 398; Berkeley, 1930: 69.

Collections. Stations 51–40 (1); 61–40 (1).

This was originally described from Puget Sound and later reported from Alaska (Chamberlin, 1919). The present records are from Canoe Bay and Cold Bay, in 15 to 40 fm.

Genus STYLARIOIDES delle Chiaje

Stylarioides papillata (Johnson)

Trophonia papillata Johnson, 1901: 416, pl. 12, fig. 122–123; Moore, 1908: 356.

Stylarioides papillata Berkeley, 1942: 198.

Collections. Stations 35–40 (1); 128–40 (1); A 8–41 (1).

The present records are within the known range; they come from Pavlof Bay, Shelikof Strait, and Orca Bay in Prince William Sound, in 35 to 48 fm.

Genus BRADA Stimpson

Brada granulata Malmgren

Brada granulata Malmgren, 1867: 194, pl. 13, fig. 71; Murdoch, 1885*b*: 155.

Collection. Station 51–40 (1).

A single individual of this Arctic species is represented. Murdoch (1885: 155) has previously reported it from Alaska at Point Barrow, in about 3 fm. The present record is Canoe Bay, in 25 to 40 fm.

Family CAPITELLIDAE

Genus HETEROMASTUS Eisig

Heteromastus filiformis (Claparède)

Capitella filiformis Claparède, 1864: 509, pl. 4, fig. 10.

Heteromastus filiformis Fauvel, 1927: 150–152, fig. 53; Hartman, 1947: 427–428.

Collection. Head of Lazy Bay (1).

The anterior end through the fifth setigerous ring is thicker than the rest of the anterior region and its surface is reticulated. The thorax consists of 12 segments; the first is achaetous, the second to sixth segments have only capillary setae, and the seventh to twelfth segments are provided with long-handled hooks. The posterior abdominal segments have inflated parapodial ridges, but there are no other branchial structures. The proboscis is covered with fine papillae.

This species has been reported from both sides of the north Atlantic Ocean; the present record is the first from Alaska; the single individual comes from shore at the head of Lazy Bay.

Genus CAPITELLA Blainville

Capitella capitata (Fabricius)

Lumbricus capitatus Fabricius, 1780: 279.

Capitella capitata Chamberlin, 1920: 25B; Fauvel, 1927: 154–155, fig. 55; Berkeley, 1929: 312; Hartman, 1947: 405.

Collection. Station 47–40 (1).

The single individual comes from shore in Canoe Bay. The species has previously been reported from the north Pacific (see synonymy above).

Family MALDANIDAE

Genus NICOMACHE Malmgren

Nicomache personata Johnson

Fig. 11, *d-g*.

Nicomache personata Johnson, 1901: 419–420, pl. 13, fig. 134–139; Berkeley, 1929: 314.

Collections. Stations 61–40 (2); head of Lazy Bay (14).

The antero-dorsal region is spotted with black. There are 22 setigerous segments. The first four segments are provided with single, heavy, yellow spines in neuropodia, or the fourth may have three spines in each parapodium; the fifth has two to four spines, and farther back there is an increasing number of setal structures; a seventh may have eight spines. They are at first acicular, but by the fourth segment they are slightly rostral (Fig. 11 *d*); in the next two or three segments they are transitional and in the posterior segments are strongly beaked (Fig. 11 *e, f*).

There is a single, ante-anal, apodous, and achaetous segment. The pygidium has a circlet of 19 or 20 short, triangular papillae (Fig. 11 *g*) usually about equally spaced and similar to one another, or some may be bifurcate or reduced to mere elevations.

Typically the rostrate hooks have a strong, recurved, beaklike tooth and about six smaller teeth above (Fig. 11 *e*); the fringed region is extensive (Fig. 11 *f*). The long, hairlike dorsal setae are already present from the fourth setigerous segment and are continued posteriorly at least to the eighteenth one; they extend far out from the sides of the body (Fig. 11 *g*). The tube is thick, coarse, hard and dark, and it con-

sists of cindery or coarse sand particles cemented together.

Originally described from Washington, this species has since been reported from British Columbia (Berkeley, 1929). The present records are from Cold and Lazy Bays, in depths to 30 fm.

Nicomache lumbricalis (Fabricius)

Sabella lumbricalis Fabricius, 1780: 374.

Nicomache carinata Moore, 1906*a*: 242–244, pl. 11, fig. 36–39.

Nicomache lumbricalis Berkeley, 1942: 199.

Collections. Stations 62–40 (1); ? 35–40 (posterior end).

A single anterior end and a posterior fragment were taken. The anterior end lacks spots but is colored uniformly reddish brown. The first three setigerous segments have one (or two) large yellow spines in neuropodia. There are no transitional rostrate hooks; the fourth setigerous segment has series of 10 to 12 much smaller rostrate hooks, continued posteriorly. There are two preanal achaetous segments.

Berkeley (1942: 199) has referred *N. carinata* Moore to this species—a conclusion which seems justified. The present records are within the known range, including southern Alaska south to Vancouver Island, Canada.

Genus PETALOPROCTUS Quatrefages

Petaloproctus tenuis borealis Arwidsson

Petaloproctus tenuis borealis Arwidsson, 1907: 118–122, pl. 3, fig. 85–90, pl. 8, fig. 268–272; Berkeley, 1942: 199.

Collection. Station 70–40 (1).

A single tiny individual, only 11 mm. long and very slender, is probably a juvenile; it is partly surrounded by a sandy tube. The anal plaque is large and entire; the margin is not crenulate. There are 21 setigerous segments and two preanal, achaetous ones. The first three neuropodia are provided with heavy, acicular spines.

Originally described from Scandinavia, this species has been reported from British Columbia by Berkeley (1942); the present individual is from Cold Bay, in 15 to 35 fm.

Genus ASYCHIS Kinberg

? Asychis lacera (Moore) new combination

Maldane lacera Moore, 1923: 235–237.

Collection. Station 139–40 (1–, anal plaque missing).

A single incomplete individual is questionably referred to this species. The first setigerous segment has a conspicuous collar, deepest on the ventral side. The cephalic plaque is crenulate along its margin and has about 12 lobes on the dorsal margin. The first setigerous segment lacks neuropodia but the second one has a transverse series of rostrate hooks, as do those farther back.

This species remains unknown except through the original account, based on a single complete individual, 55 mm. long, dredged from southern California in 549 to 585 fm. Through the courtesy of the administration of the U. S. National Museum, I have been able to examine the type. The prostomial keel is only weakly observable, hence it is here referred to *Asychis* Kinberg. Both cephalic and anal plaques are crenulate at their outer margins. The cephalic plaque has deep lateral incisions and 12 nearly equitriangular lobes around its dorsal margin. The lateral portions are set off from the entire ventral lobe, and the shorter lateral lobes have three to five irregular, crenulate lobes. The anal plaque has deep, circular incisions; its ventral margin has four pointed, triangular lobes; the dorsal edge has seven shallow, triangular lobes. There is a conspicuous, sheathing, complete collar at the anterior margin of the first setigerous segment, highest on the ventral side; it has a lateral incision just above the first setal fascicle.

The single fragment in the collection is referred to this species largely because of the deep,

sheathing collar and the crenulate cephalic plaque.

This species has remained unknown except through the single record from deep water off southern California; the present record is off Hallo Bay, in 28 to 40 fm.

Family SABELLARIIDAE

Genus IDANTHYRSUS Kinberg

Idanthyrsus ornamentatus Chamberlin

? *Sabellaria saxicava* Baird, 1863: 109.
Idanthyrsus ornamentatus Chamberlin, 1919: 262–263, pl. 3, fig. 2–5; Hartman, 1944: 337, pl. 31, fig. 34.
Pallasia johnstoni Berkeley, 1930: 74–75.

Collections. Stations 13–40 (10); 126–40 (3); 131–40 (1); 139–40 (1); D 11–41 (1).

The tubes are firmly concreted and broadly attached to the substratum. They tend to be sinuous or slightly coiled. They are attached to pelecypod shells, living or broken fragments, also the carapace of decapods and other hard objects.

I. ornamentatus is distinguished from nearly related species, *I. armatus* Kinberg and *I. pennatus* (Peters), most conspicuously in the shape of the outer opercular spines (Hartman, 1944). *Sabellaria saxicava* Baird is incompletely known but originates from Vancouver Island, hence is questionably referred to this species. Berkeley (1930: 74) considered *I. ornamentatus* and *Sabellaria saxicava* probably synonymous, a conclusion which I consider also likely, but she referred them to *Pallasia johnstoni* (McIntosh) which has been referred to *I. pennatus* (Peters) (see Johansson, 1927: 88–90). The last named is a nearly related species, but distinguishable in the structure of the outer opercular spines.

Previous records are from northern California to southern Alaska. The present records are from Canoe Bay, in 30 fm., north side of Shelikof, in 65–80 fm., off Cape Chiniak, in 32–35 fm., off Hallo Bay, in 28–40 fm., and Walrus Island, Bering Sea, in 31–33 fm.

Family AMPHARETIDAE

Genus AMPHICTEIS Grube

Amphicteis alaskensis Moore

Amphicteis alaskensis Moore, 1905*c*: 846–849, pl. 44, fig. 1–4.

Collection. Station 59–40 (1).

The single individual measures 32 mm. long. The original collection comes from Kadiak Bay, and southeast Alaska, in 41 to 48 fm. The present record is from between Inner Iliasik and Goloi Island, in 20 to 30 fm.

Genus AMPHARETE Malmgren

Ampharete grubei Malmgren

Ampharete grubei Malmgren, 1866: 363, pl. 19, fig. 44; Moore, 1923: 201; Fauvel, 1927: 227–228, fig. 79; Berkeley, 1942: 201.

Collection. Station D 3–41 (1).

This species has been recorded from both sides of northern North America and the north Atlantic Ocean (see synonymy above). The present record is from Castle Bay, off Chignik Bay, in 21 to 52 fm.

Family TEREBELLIDAE

Genus AMPHITRITE Müller

Amphitrite cirrata Müller

Amphitrite cirrata Müller, 1776: 188; Chamberlin, 1920: 22B; Berkeley, 1942: 202.
Amphitrite palmata Moore, 1905*c*: 858–859, pl. 44, fig. 19–22.
Amphitrite radiata Moore, 1908: 350.

Collections. Stations 60–40 (2); C 5–41 (1); D 7–41 (1); D 11–41 (2); head of Lazy Bay (2).

Individuals attain a length of about 150 mm. There are 17 thoracic setigerous segments. Each of the three branchial segments has a pair of lateral lappets. Thoracic notopodia are provided largely with smooth capillary setae, but the

shorter ones are very finely toothed at the tip. Branchiae consist of many simple filaments that are palmately arranged. The tube is thick-walled and made up of sand and mud that is closely packed.

Amphitrite palmata Moore (1905*c*: 858), from Alaska, is here considered to be identical; since the specific name *palmata* was preoccupied by Malmgren, the specific name *radiata,* was later proposed (Moore, 1908: 350).

The present records extend from Icy Straits, east end of Pleasant Island, west and north to the east end of Walrus Island, Bering Sea; the bathymetric range is shore to 38 fm.

Genus NEOLEPREA Hessle

Neoleprea spiralis (Johnson)

Amphitrite spiralis Johnson, 1901: 426–427, pl. 16, fig. 169–171.
Neoleprea spiralis Hessle, 1917: 193; Berkeley, 1942: 205.
Terebella spiralis Berkeley, 1929: 308–309.

Collection. Station 12–40 (1).

There are 40 thoracic setigerous segments. The two pairs of branchiae are dendritically branched. The anterior end lacks thoracic lappets. Thoracic setae are distally toothed.

Originally recorded from Washington, this species has been further reported from British Columbia (Berkeley, 1929, 1942); the present record extends the range to Canoe Bay, Alaska, shore.

Genus EUPOLYMNIA Verrill

Eupolymnia crescentis Chamberlin

Eupolymnia crescentis Chamberlin, 1919: 265–266, pl. 3, fig. 6–7.

Collection. Station 128–40 (14).

The peristomial fold is provided with numerous small eyespots. This species was first described from northern California; the present record is from Shelikof Strait, off Hallo Bay, in 35 to 48 fm.

Genus NEOAMPHITRITE Hessle

Neoamphitrite robusta (Johnson)

Amphitrite robusta Johnson, 1901: 425–426, pl. 16, fig. 164–168; Moore, 1908: 350.
Neoamphitrite robusta Hessle, 1917: 184; Berkeley, 1942: 202.
Terebella robusta Berkeley, 1929: 308.

Collections. Stations C 5–41 (1); D 3–41 (1).

Both records are in the vicinity of the known range in the northeast Pacific. The localities are Icy Straits in 7 fm., and Castle Bay, in 21 to 52 fm.

Genus NICOLEA Malmgren

Nicolea zostericola (Oersted)

Terebella zostericola Oersted, 1844: 68.
Nicolea zostericola Fauvel, 1927: 261–262, fig. 90.

Collection. Station D 15–41 (1).

There are 15 thoracic setigerous segments; uncini are present from the second of these. Branchiae number two pairs and are dendritically branched; they are inserted on the two segments preceding the first setigerous segment. The peristomium has a row of eyespots. Nephridial papillae are present on the second branchial segment and on the third and fourth setigerous segments; they have long lobes externally. Thoracic dorsal setae are smooth and capillary; uncini are avicular.

In so far as I am aware, this is the first record from the north Pacific; it originates 20 miles north of St. Lawrence Island, in the Bering Sea, in 15 to 16 fm.

Genus THELEPUS Leuckart

Thelepus hamatus Moore

Thelepus hamatus Moore, 1905: 856–858, pl. 44, fig. 16–18; Berkeley, 1929: 309.

Collection. Station 80–40 (1).

A single small individual, posteriorly incomplete, measures only 16 mm. for 35 setigerous segments, but the body cavity contains large, yolk-laden eggs. The body is broadest in the anterior thoracic region. Ventral scutigerous plates are very broad through the first four setigerous segments and occupy the space across the ventrum so that parapodia are dorso-lateral in position. The peristomium has a band of dark brown eyespots. Branchiae are on the two presetal segments and consists of a few short, tentacular filaments, each inserted separately from the others. Pointed dorsal setae are smooth and limbate; they are continued posteriorly through at least 35 segments. Uncini are first present from the third setigerous segment; they have the form originally shown, with a strong main tooth and two or three lesser teeth above, surmounted by more numerous small denticles.

This species was first made known from the Behm Canal, Alaska, in 130 to 193 fm.; later Berkeley (1929: 309) recorded it from British Columbia. The present record is from Larsen Bay, on the east side of Nagai Island, in 5 to 25 fm.

Genus LEAENA Malmgren

Leaena abranchiata Malmgren

Leaena abranchiata Malmgren, 1866: 385, pl. 24, fig. 64; Hessle, 1917: 197.

Collection. Station D 3–41 (1).

The single individual has 10 thoracic setigerous segments; uncini are present from the second one. Thoracic dorsal setae are broadly bilimbate. Uncini occur in double rows only in the tenth to sixteenth uncinigerous segments. There is a conspicuous, high, dorsal membrane across the segment preceding the first setigerous one.

Apparently this is the first record from the north Pacific; it comes from Castle Bay, off Chignik Bay, in 21 to 52 fm. It has been previously reported from the north Atlantic.

Genus SPINOSPHAERA Hessle

Spinosphaera sp.

Collection. Station 61–40 (one fragment).

A single, incomplete fragment consists of about 55 setigerous segments and measures 16 mm. long. There are over 48 thoracic segments. Branchiae and peristomial eyespots are absent. Thoracic dorsal setae are limbate; some have a dentate tip and a subapical spinous region, as typical of the genus. Uncini are avicular. The record is from Cold Bay, in 15 to 30 fm.

Genus POLYCIRRUS Grube

Polycirrus sp.

Collection. Station 60–40 (1).

A single individual that cannot be definitely referred to any known species has 13 anterior thoracic setigerous segments which lack uncini; this is followed by a region of over 50 segments provided with uncini. The collection was made in Leonard Harbor, in 20–25 fm.

Family SABELLIDAE

Genus SABELLA Linnaeus

This genus has come to include two groups of species; one (to which the genotype *S. penicillus* Linnaeus belongs) lacks tentacular paired eyespots and the tentacular radiole is not angulate on its external margins; the other (to which *S. crassicornis* Sars belongs) has paired tentacular eyespots and the tentacular radiole is strongly angulate on its external margins. Since the genera *Demonax* Kinberg and *Parasabella* Bush were erected for species which belong to the genotypic group *Sabella,* these designations must be regarded as synonyms of *Sabella* Linnaeus. It may be desirable to erect a new name for the group to which *S. crassicornis* Sars belongs. (See also Hartman, 1942: 78.)

Sabella media (Bush)

Parasabella media Bush, 1904: 200–201, pl. 27, fig. 3–5, pl. 33, fig. 34–36, pl. 34, fig. 3, pl.

36, fig. 13, 14, pl. 37, fig. 30; Berkeley, 1930: 70; Berkeley, 1932*a*: 315.

Parasabella maculata Bush, 1904: 201, pl. 28, fig. 8, 9, pl. 33, fig. 8, 12, 33, pl. 34, fig. 2, pl. 36, fig. 12, 15, 16, 21, 22.

Sabella media Hartman, 1942: 79–80, fig. 159, 160.

Collection. Canoe Bay (1).

The single collection is from Alaska, from a previously reported locality.

Sabella crassicornis Sars

Sabella crassicornis Sars, 1851: 202–203; Johansson, 1927: 119–121; Hartman, 1942: 78–79.

Sabella elegans Bush, 1904: 194–195, pl. 26, fig. 2, pl. 27, fig. 6, pl. 33, fig. 20, 21, pl. 34, fig. 1, 4, 5, 10; Moore, 1908: 359; Berkeley, 1930: 70.

Sabella leptalea Bush, 1904: 195–196, pl. 27, fig. 6.

Collections. Station 60–40 (2); Seldovia (2).

This species is common in cold waters of both northern Pacific and Atlantic oceans; the present records are near the known range; they come from Leonard Harbor in 20 to 25 fm. and from the beach at Seldovia.

Genus POTAMILLA Malmgren

Potamilla neglecta (Sars)

Sabella neglecta Sars, 1851: 203.

Aspeira modesta Bush, 1904: 202–203, pl. 25, fig. 3, pl. 36, fig. 27–31, 33–35.

Potamilla neglecta Johansson, 1927: 143–145; Hartman, 1942: 81.

Collection. Station D 15–41 (1).

This has been reported from Kadiak, Alaska (Bush, 1904); the present record is from 20 miles north of St. Lawrence Island, Bering Sea, in 15 to 16 fm.

Genus PSEUDOPOTAMILLA Bush

Pseudopotamilla intermedia Moore

Pseudopotamilla intermedia Moore, 1905*b*: 562–564, pl. 37, fig. 15–22; Hartman, 1938*a*: 19, 25, 26.

Pseudopotamilla reniformis Moore, 1908: 359–360; Berkeley, 1930: 70; Berkeley, 1932*a*: 315.

Collections. Stations 20–40 to 22–40 (fragment); 60–40 (many).

The type locality is Afognak Bay, Alaska, in 14 to 19 fm. (Moore, 1908: 359). Present records are from Canoe Bay, in 15 to 40 fm., and Leonard Harbor, in 20 to 25 fm.

Pseudopotamilla occelata Moore

Pseudopotamilla occelata Moore, 1905*b*: 559–562, pl. 37, fig. 8–14; Berkeley, 1930: 70; Hartman, 1938*a*: 19, 20, 25, 26, 27, pl. 2, fig. 6, 7.

Pseudopotamilla brevibranchiata Moore, 1905*b*: 555–559, pl. 37, fig. 1–7.

Collections. Stations 61–40 (2); Mist Harbor (2).

These records, Cold Bay, in 15 to 30 fm., and Mist Harbor, are within known ranges.

Genus SCHIZOBRANCHIA Bush

Schizobranchia insignis Bush

Schizobranchia insignis Bush, 1904: 206–207, pl. 24, fig. 1, 2, pl. 27, fig. 1, pl. 28, fig. 5, pl. 35, fig. 2, 12, 13, 15, 16, 26, 27; Hartman, 1942: 82–83; Berkeley, 1942: 206.

Schizobranchia nobilis Bush, 1904: 207, pl. 24, fig. 3, pl. 28, fig. 7, pl. 33, fig. 22, pl. 35, fig. 1, 3–6, 8, 10, 11, 23; Berkeley, 1930: 71.

Collections. Stations 61–40 (1); under the dock at Sand Point (1).

Both individuals have eight thoracic setigerous segments; tentacular radioles are split three to five times. These records are within the known range.

Schizobranchia dubia Bush

Schizobranchia dubia Bush, 1904: 208–209, pl. 28, fig. 1, pl. 29, fig. 1, pl. 33, fig. 7, pl. 36, fig. 1–3, 17–20, pl. 37, fig. 28; Hartman, 1942: 83–84.

Collections. Stations 20–40 to 22–40 (many); 24–40 (many); 51–40 (many); 52–40 (tubes only); 61–40 (many); 108–40 (many); C 150–41 (many).

In most instances there are many tubes clustered together; they are interwoven but not connected to one another at their bases. The tubes have a strong, tough chitinized base and are usually covered on the outside, especially distally, with fine, dark-colored sand grains. Thoracic setigerous segments usually number only six, though rarely seven or five. Tentacular radioles are bifurcated once or twice, or rarely three times.

This species was originally described from Alaska; the present collections are from Canoe Bay in 15 to 125 fm., Cold Bay in 15 to 30 fm., Alitak Bay on the reef, and off Moffet Point in 60 fm.

Genus MYXICOLA Koch

Myxicola infundibulum (Montagu)

Amphitrite infundibulum Montagu, 1808: 109–110, pl. 8.

Myxicola pacifica Johnson, 1901: 431–432, pl. 19, fig. 193–198.

Myxicola conjuncta Bush, 1904: 217–218, pl. 26, fig. 1, 4, pl. 38, fig. 1–11.

Myxicola infundibulum Hartman, 1938*a*: 19, pl. 1, fig. 5–11, pl. 2, fig. 1; Hartman, 1942: 86.

Collections. Stations 12–40 (1); D 11–41 (1).

This cosmopolitan species has been reported from Alaska (see synonymy above). The present collections are from Canoe Bay, shore, and east of Walrus Island, Bering Sea, in 31 to 33 fm.

Genus CHONE Kröyer

Chone sp.

Collections. Stations 36a–40 (1); 108–40 (1).

Two tiny individuals, measuring less than 10 mm. long, whose specific identity has not been determined, come from Pavlof Bay in 27 fm. and Alitak Bay, reef.

Family SERPULIDAE

Genus SERPULA Linnaeus

Serpula vermicularis Linnaeus

Serpula vermicularis Linnaeus, 1767: 1267; Chamberlin, 1919: 269; Berkeley, 1930: 73; Berkeley, 1932*a*: 316; Hartman, 1942: 16; Berkeley, 1942: 206.

Serpula columbiana Johnson, 1901: 432–433, pl. 19, fig. 199–204.

Serpula splendens Bush, 1904: 230–232, pl. 24, fig. 3, pl. 29, fig. 2, pl. 30, fig. 2, 3, pl. 33, fig. 31, pl. 35, fig. 18, pl. 37, fig. 31, pl. 39, fig. 33.

Collection. Seldovia (1).

This species is well known from the northeast Pacific, including Alaska.

Genus CRUCIGERA Benedict

Crucigera zygophora (Johnson)

Serpula zygophora Johnson, 1901: 433–434, pl. 19, fig. 205–208.

Crucigera zygophora Bush, 1904: 233, pl. 29, fig. 5, pl. 31, fig. 2, pl. 33, fig. 3, pl. 39, fig. 8–13, 15, 17, 20; Berkeley, 1942: 207; Hartman, 1942: 87–88.

Crucigera formosa Bush, 1904: 233–234, pl. 28, fig. 3, 4, pl. 31, fig. 1, pl. 33, fig. 4, pl. 39, fig. 6, 7, 10, 11, 14.

Collections. Stations 12–40 (12 and tube clump); 13–40 (1); 21–40 (1+), 20–40 to 22–40 (clump); 24–40 (1); 70–40 (several); 82–40 (clump); 109–40 (clump); C 160–

41 (clump); L 18–41 (clump); Canoe Bay (clump); Mist Harbor (clump).

These localities are within the known range in Alaska. Depths range from shore to 125 fm.

Crucigera irregularis Bush

Crucigera irregularis Bush, 1904: 234, pl. 25, fig. 5, pl. 29, fig. 4, pl. 33, fig. 13, pl. 39, fig. 1–5; Berkeley, 1930: 73; Berkeley, 1942: 73.

Collections. Stations 60–40 (1); 84–40 (1); 88–40 (1); 139–40 (1); A 8–41 (1); D 11–41 (1).

Originally described from Juneau, Alaska, this species has been reported from British Columbia (Berkeley, 1942); the present collections come from southern and southwestern Alaska, in 15 to 39 fm., and from Walrus Island, Bering Sea, in 31 to 33 fm.

Genus CHITINOPOMA Levinsen, emended

Type *C. groenlandica* (Mörch)

The operculum is soft and conical; it is covered by a slightly convex, chitinous plate. The tube is calcareous, elongate, more or less irregularly sinuous, and provided with a strong, longitudinal carina. The tentacular crown has six or seven pairs of radioles, each provided with long paired pinnae and a longer or shorter free distal end. The thoracic collar is high; it consists of a pair of dorsal lobes and a broad, ventro-lateral portion; a thoracic membrane is absent. Thoracic setigerous segments number seven. The collar ring is provided with a setal fascicle, including special setae with a finlike expansion, and geniculate setae. Other thoracic segments have notopodia and neuropodia. The setal formula is as follows: thorax with smooth geniculate and slender setae in notopodia, and flat uncinial plates with about nine teeth in neuropodia. Abdominal segments are numerous, each is provided with uncinial plates in notopodia and only one or two geniculate setae in neuropodia.

The type of the genus, *C. groenlandica* (Mörch), was originally named *Serpula triquetra* Fabricius (1780) (not Linnaeus) and originated in Greenland. Mörch, in a revision of the family (1863: 375), referred this species to *Hydroides norvegica* var. *groenlandica*. Malmgren (1867: 120) raised the variety to rank of species, questionably in the genus *Hydroides*. Later, Levinsen (1884: 203) erected the genus *Chitinopoma*, with new species, *C. fabricii*, and referred *Serpula triquetra* Fabricius to it. As shown by Bush (1904: 229) (in footnote), Levinsen's name is superfluous and must give way to Malmgren's name.

In a key to the *Serpulidae*, Bush (1904: 224) placed *Chitinopoma* Levinsen in the same category with *Hyalopomatopsis* St. Joseph, and differentiated them thus:

> *Chitinopoma* with uncinial plates trapeziform, with appressed teeth, the lowest larger than the others. Operculum with concave horny plate.
>
> *Hyalopomatopsis* with uncini somewhat similiar to those in *Spirorbis*, the teeth longer. Operculum with a chitinous or horny cap.

Actually, these statements reveal no real differences, since the opercular caps are convex in both cases and the shape of uncinial plates is not materially different. Both have a soft operculum with horny, convex cap, and both have a high thoracic collar and no thoracic membrane. However, the type of *Hyalopomatopsis*, *H. marenzelleri* (Langerhans), has only six thoracic setigerous segments; *Chitinopoma* has seven; abdominal setae are geniculate in the latter, not so in the former. Capillary setae are present only in the second to seventh thoracic setigerous segments in *Chitinopoma*, and presumably present in all segments in *Hyalopomatopsis* (see Chamberlin, 1919: 475). The type of *Hyalopomatopsis* originates from abyssal depths in the middle east Atlantic Ocean and may be known through only a single species. A second species which has been attributed to it, *H. occidentalis* Bush (1904: 229), is now referred to *Chitinopoma* (see page 50).

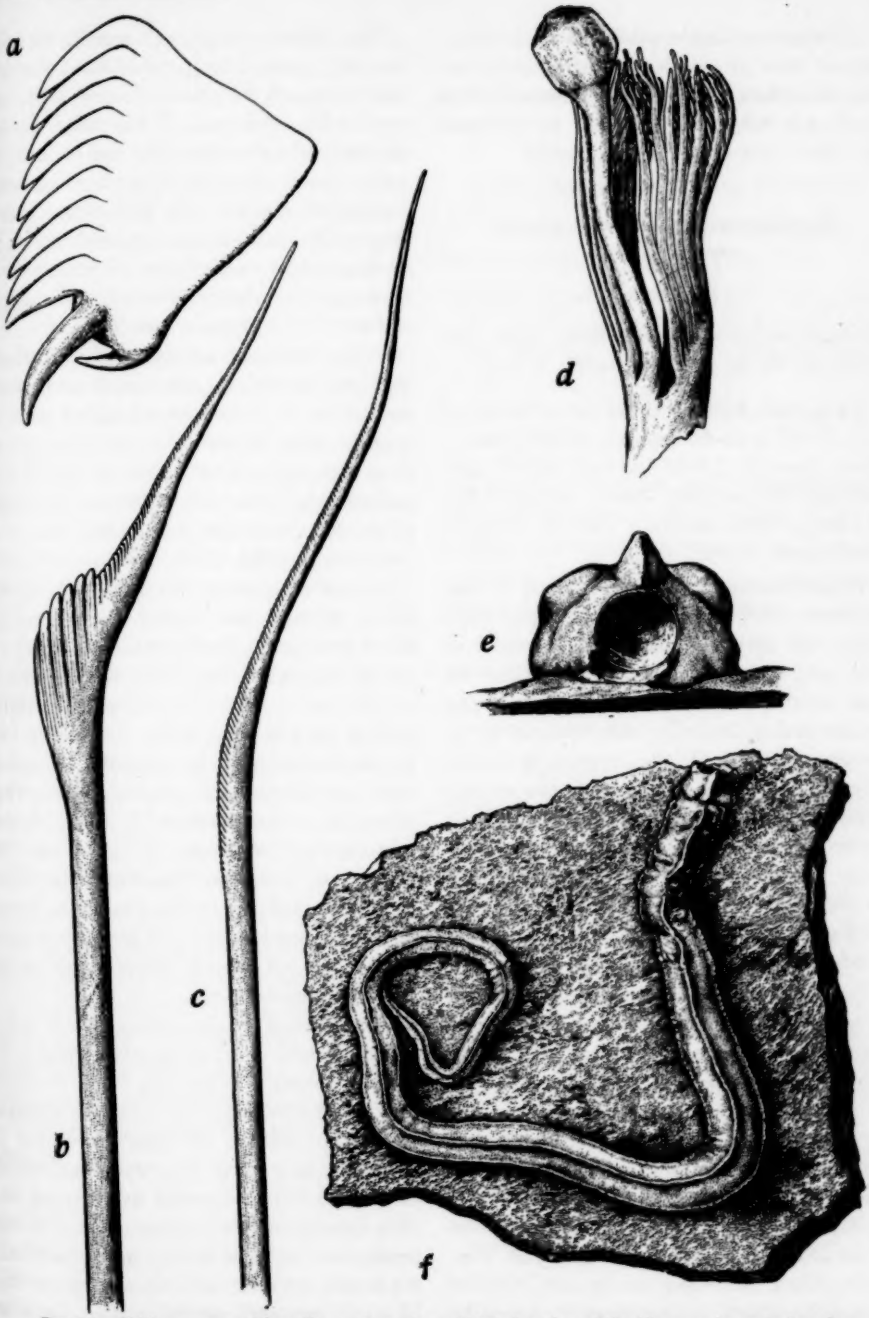

FIG. 12. *Chitinopoma occidentalis: a,* thoracic uncinial plate from left side, seen in posterior view, × 1342; *b,* larger collar seta, seen from the side, × 748; *c,* smaller collar seta from the same fascicle, seen from the side, × 895; *d,* anterior end of body, showing operculum with attached tentacular crown, in dorsal view (opercular cap turned to right to show asymmetry), × 19.4; *e,* anterior end of tube, showing circular aperture, × 15.6; *f,* entire tube attached to shell fragment, in dorsal view, × 4.4.

Chitinopoma may be nearly related to *Microserpula* Dons for which the single known species, *M. inflata* Dons, has been recorded from Arctic seas (Brattström, 1945). In the latter, the tube is said to have ovicels distally.

Chitinopoma occidentalis (Bush) new combination

Fig. 12, *a-f*.

Hyalopomatopsis occidentalis Bush, 1904: 229–230, pl. 40, fig. 3, 22, pl. 44, fig. 2, 4, 8.

Collections. Stations 13–40 (several); 21–40 (3); 20–40 to 22–40 (many); 24–40 (many); 25–40 (several); 35–40 (several); 47–40 (several); 61–40 (several); 70–40 (several); 82–40 (few); 84–40 (several); 100–40 (several); Mist Harbor (1+).

White calcareous tubes are attached to shell fragments, other serpulid tubes, gastropod shells, living rock oysters, branchiopods, carapace of crabs, and other hard surfaces. The tubes are hard, smooth, and broad; they have a strong, median keel with a sharp notch above, at the aperture (Fig. 12 *f*); the aperture is circular (Fig. 12 *e*). Tubes seldom cover one another unless crowded; they are sinuous or irregularly twisted; they measure 30 to 50 mm. long. Larger individuals (fixed in the tube) are 15 to 20 mm. long. The body consists of a well-developed tentacular crown, seven thoracic, and 50 or fewer abdominal, segments.

The operculum replaces the dorsal radiole on the left side. It has a smooth, straight stalk and extends distally beyond the outer ends of the radioles. The expanded, distal portion, seen from the dorsum is symmetrical, but seen from the side (Fig. 12 *d*) is asymmetrical, the greater convexity on the ventral side. It is a soft, pale vesicle surmounted by a slightly chitinized, convex cap. The tentacular crown has six radioles on the left side, seven on the right one. Tentacular pinnae are longest on the distal third of the radiolar length but surpassed in length by the long, free distal filament of the rachis.

The collar is a high, thin membrane; it consists of a pair of long, dorsal lobes that completely conceal the peristomium; they are separated from other parts of the collar by deep, dorso-lateral clefts. Laterally and ventrally, the collar consists of a still longer piece that extends forward to conceal over half of the radiolar length. When the collar is pushed back, a pair of deep-seated, ocular spots is visible in the fleshy base of the peristomium. There is no indication of a thoracic membrane.

Collar setae are arranged in a lengthwise, horizontal series, slightly dorsal to the other notopodia. They have two kinds of setae; anteriorly there are six or seven larger, pointed setae with broad, thick expansion (Fig. 12 *b*); immediately behind are a comparable number of slenderer ones that are also crenulate at the outer margin (Fig. 12 *c*).

Second to seventh thoracic setigerous segments resemble one another, but the last one has a greatly reduced parapodium. Notopodia are each provided with two kinds of setae, including six to eight heavier, smooth, slightly limbate ones in front, and a comparable number of slenderer ones farther back. Neuropodia have vertical rows of uncinial plates. These plates, where best developed in middle thoracic segments, number about 50 in a ridge. The largest ones are at the ventral end of the series, decreasing gradually in size dorsally, so that the uppermost one is only about half as long as the lowest. The last thoracic neuropodium has only about 15 uncinial plates.

The structure of the uncinial plates is such that their three-dimensional arrangement is difficult to ascertain in any one view. As typical of other serpulids, they lie in a closely appressed row. It is difficult to dissect them out individually, since there is a strong tendency for all of them to hold together and to spring back after depression. The reason for this is only partly that they are bound together by fleshy fibrils and muscles. Actually, each plate (Fig. 12 *a*) is provided with a locking mechanism which interlaces with the plates on either side;

all hooks of a series are thus held together firmly so that they function as units. One may liken the plate to a hand in which the broad, embedded part is the palm, and the distal free teeth the fingers. The teeth of the plate are extended at an angle slightly obtuse to the plate, or one might say that palm and fingers are at somewhat greater than right angles to each other. As a result, one cannot see both palm and fingers in full outline at any one time. The teeth, numbering usually nine (less often 10) are nearly equal to one another in size; they are long and slender, with tapering, slightly curved tips; they project from the fleshy lobe of the neuropodium. In addition to these nine teeth, the lowest end of the plate has two additional hooks, a smaller distal one, corresponding to the thumb of a hand, which is directed backward and ventrally, and a longer, more outstretched one, comparable to an index finger, which is directed forward and ventrally. These two hooks constitute the locking mechanism, interlacing with similar hooks on the plates proximal to them.

Abdominal parapodia have similar, though smaller, uncinial plates in notopodia, and one or two toothed setae in neuropodia. The abdomen consists of 45 to 50 segments and terminates posteriorly in a pair of short, subspherical papillae below the anal aperture.

C. occidentalis was originally described from Prince William Sound and later reported from Alaska (Moore, 1908: 362). *Hyalopomatopsis occidentalis* Moore (1923: 254), off Santa Rosa Island, California, may be another species (or genus) since the tube has not only a median carina, but the surface is wrinkled with transverse growth lines, and the collar setae are different.

C. groenlandica Levinsen has also been reported from the northeast Pacific (Pixell, 1912: 790, and Berkeley, 1930: 74). This differs from *C. occidentalis* in that the tube has not only a median carina, but also fine transverse striations and the special collar setae have a finlike portion that is set off from the main blade by a constriction.

The present collections are from south and southwestern Alaska, from shore to 125 fm.

Genus DEXIOSPIRA Caullery and Mesnil

Dexiospira spirillum (Linnaeus)

Serpula spirillum Linnaeus, 1767: 1264.

Spirorbis spirillum Moore, 1908: 362; Pixell, 1912: 796–797, pl. 88, fig. 8; Berkeley, 1930: 74; Berkeley, 1932: 316; Berkeley, 1942: 207.

Spirorbis (*Dexiospira*) *spirillum* Fauvel, 1927: 392–393, fig. 132.

Collections. Stations 9–40 (many); 10–40 (6); 25–40 (many); 52–40 (10).

Tubes are attached to algae or hard objects.

This species has been reported from intertidal regions of the northeast Pacific, including Alaska. The present records are well within known ranges.

Genus LAEOSPIRA Caullery and Mesnil

Laeospira borealis (Daudin)

Spirorbis borealis Daudin, 1800: 145; Borg, 1917: 22–26, fig. 5–11; Hartman, 1942: 92–93.

Spirorbis asperatus Bush, 1904: 245, pl. 28, fig. 10, pl. 30, fig. 4, pl. 41, fig. 4–6, 8, 10, 11, 19, 31, 32, pl. 43, fig. 1–3, 7, 13, 26.

Collection. Station 25–40 (several).

These individuals come from Canoe Bay, in 25 fm. Previous records are from Sitka and Prince William Sound, Alaska (Bush, 1904).

Genus PARADEXIOSPIRA Caullery and Mesnil

Paradexiospira violaceus (Levinsen)

Spirorbis violaceus Levinsen, 1884: 202; Bush, 1904: 242–243, pl. 41, fig. 1, 2; pl. 42, fig. 8–12.

Spirorbis (*Paradexiospira*) *violaceus* Fauvel, 1927: 391–392, fig. 132.

Collections. Stations 20–40 to 22–40 (many); 24–40 (3); 25–40 (several).

Tubes are attached to hard objects such as shell fragments, stones, carapace of crabs. Bush (1904) has reported the species from Sitka, Alaska, and British Columbia. Present records are from southern Alaska in 15 to 125 fm.

LIST OF STATIONS

Sta. 3–40. Sept. 6. Port Ashton, Alaska. Shore, at high tide.
Sta. 9–40. Sept. 13. Canoe Bay, northern part. Shore, at high tide.
Sta. 10–40. Sept. 16. Canoe Bay, southwest shore. Shore, at high tide.
Sta. 12–40. Sept. 17. Canoe Bay, north shore.
Sta. 13–40. Sept. 17. Canoe Bay, northwest corner. Gill net, in 30 fm.
Sta. 20–40. Sept. 21. Canoe Bay, middle part. Otter trawl, in 40 fm.
Sta. 21–40. Sept. 21. Canoe Bay, northwest part. Otter trawl, in 35 fm.
Sta. 20, 21, 22–40. Sept. 21. Around Canoe Bay. Otter trawl, in 15–40 fm.
Sta. 24–40. Sept. 23. Canoe Bay, northwest part. Trawl, in 125 fm.
Sta. 25–40. Sept. 23. Canoe Bay, northwest part. Trawl, in 25 fm.
Sta. 26–40. Sept. 23. Canoe Bay, northwest part. Trawl, in 100 fm.
Sta. 27–40. Sept. 23. Canoe Bay, entire western part. Trawl, in 14–36 fm.
Sta. 31–40. Sept. 24. Canoe Bay. Trawl, in 34–36 fm.
Sta. 33–40. Sept. 25. Pavlof Bay, northern part. In 18 fm.
Sta. 34–40. Sept. 25. Pavlof Bay, middle section. In 150 fm.
Sta. 35–40. Sept. 25. Pavlof Bay, entrance to bay by Cape Tolstoi. Sticky bottom.
Sta. 36a–40. Sept. 25. Pavlof Bay, in 27 fm.
Sta. 47–40. Sept. 29. Canoe Bay, mid-northern shore. Shore, at low tide.
Sta. 51–40. Oct. 2. Canoe Bay. In 25–40 fm.
Sta. 52–40. Oct. 2. Canoe Bay. In 40 fm.
Sta. 58–40. Oct. 8. Volcano Bay. In 25–30 fm.
Sta. 59–40. Oct. 8. Between inner Iliasik and Goloi Island. In 20–30 fm.
Sta. 60–40. Oct. 10. Leonard Harbor. In 20–25 fm.
Sta. 61–40. Oct. 10. Cold Bay. In 15–30 fm.
Sta. 62–40. Oct. 11. Cold Bay. In 15–20 fm.
Sta. 66–40. Oct. 15. Canoe Bay, northwestern part. In 35–45 fm.
Sta. 70–40. Oct. 17. Cold Bay. In 15–35 fm.
Sta. 71–40. Oct. 17. Cold Bay. In 15–25 fm.
Sta. 72–40. Oct. 17. Cold Bay. In 15–50 fm.
Sta. 80–40. Oct. 21. Larsen Bay, on east side of Nagai Island. In 5–25 fm.
Sta. 82–40. Oct. 22. Off southwest shore of Big Koniuji Island. In 25–30 fm.
Sta. 83–40. Oct. 22. Off south side of Big Koniuji Island. In 25–55 fm.
Sta. 84–40. Oct. 24. Stepovak Bay. In 15 fm.
Sta. 88–40. Oct. 24. Stepovak Bay. In 90 fm.
Sta. 89–40. Oct. 25. Unga Strait or Stepovak Bay. In 37–47 fm.
Sta. 91–40. Oct. 26. Baralof Bay, Squaw Harbor. In 24 fm.
Sta. 93–40. Oct. 29. Spitz Island. In 55–68 fm.
Sta. 97–40. Oct. 21. Alitak Bay. In 18–30 fm.
Sta. 98–40. Oct. 31. Alitak Bay. In 42 fm.
Sta. 100–40. Oct. 31. Alitak Bay. In 30 fm.
Sta. 103–40. Nov. 1. Alitak Bay. In 20–45 fm.
Sta. 106–40. Nov. 2. Alitak Bay. In 15–30 fm.
Sta. 107–40. Nov. 2. Alitak Bay. In 30 fm.
Sta. 108–40. Nov. 3. Alitak Bay. From reef.
Sta. 109–40. Nov. 4. South entrance to Olga Bay. In 40 fm.
Sta. 116–40. Nov. 6. Off Cape Alitak. In 40 fm.
Sta. 126–40. Nov. 14. North side of Shelikof. In 65–80 fm.
Sta. 128–40. Nov. 15. Shelikof Strait, off Hallo Bay. In 35–48 fm.
Sta. 129–40. Nov. 15. Shelikof Strait, off Hallo Bay. In 48 fm.
Sta. 131–40. Nov. 16. Off Cape Chiniak. In 32–35 fm.
Sta. 131–40 or 132–40. Nov. 16. Off Cape Chiniak. In 32–35 or 45–77 fm.
Sta. 135–40. Nov. 20. Off Hallo Bay. In 40–48 fm.
Sta. 138–40. Nov. 21. Off Hallo Bay. In 28–40 fm.
Sta. 139—40. Nov. 21. Off Hallo Bay. In 28–40 fm.
Sta. 140–40. Nov. 21. Off Hallo Bay. In 28–40 fm.
Sta. A 8–41. Mar. 14. Orca Bay, off Sheep Point, Prince William Sound. In 36 fm., blue mud.
Sta. A 61–41. May 8. 40 mi. above Port Moller. In 17–18 fm., sand, gravel.
Sta. BT 70–41. Aug. 18. Bering Sea, off Black Hill. In 33 fm., gray sand.

MAP II. Southwestern Alaska and adjacent seas, indicating by number all stations at which collections of annelids were made by the Alaska King Crab Investigation.

Sta. C 5–41. Feb. 28. Icy Straits, east end of Pleasant Island. In 7 fm., over gray glacier mud.
Sta. C 44–41. Mar. 28. Albatross Bank. In 60 fm., fine gravel and white sand.
Sta. C 71–41. Apr. 11. Pavlof Bay, north end. In 60 fm., coarse sand and mud.
Sta. C 147–41. May 31. Off Cape Leontovich. In 60 fm., fine gray sand.
Sta. 150–41. June 1. Off Moffet Point. In 60 fm., fine gray sand.
Sta. C 160–41. June 8. Canoe Bay. In 60 fm., soft mud.
Sta. CT 12–41. May 30. Off Black Hill. In 105 fm., gravel.
Sta. D 3–41. June 24. Castle Bay, off Chignik Bay. In 21–52 fm.
Sta. D 7–41. July 17. Bering Sea, 57° N, 163° 48′ W, in 38 fm.
Sta. D 8–41. July 18. Bering Sea, 58° 34′ N, 165° 17′ W, in 42 fm.
Sta. D 11–41. July 24. Bering Sea, 12½ mi. east of Walrus Island, Pribilofs. In 31–33 fm.
Sta. D 14–41. Aug. 5. Bering Sea, 62° 25′ N, 173° W, in 36 fm.
Sta. D 15–41. Aug. 7. Bering Sea, 20 mi. north of St. Lawrence Island, in 15–16 fm.
Sta. D 16–41. July 18. 50 mi. northwest of Amak Island, Bering Sea, in 50 fm.
Sta. L 2–41. Mar. 19. Olga Bay, south end of Kodiak Island. In 25–30 fm.
Sta. L 3–41. Mar. 19. Lazy Bay, Alitak. In 15 fm.
Sta. L 4–41. Mar. 19. 9 mi. SSW of Cape Alitak, 56° 48′ N, 154° 30′ W. In 35 fm.
Sta. L 11–41. Mar. 22. Three Saints Bay, Kodiak Island. In 20–30 fm.
Sta. L 13–41. Mar. 23. Port Hobson, north end of Sitkalidak Island. In 15 fm.
Sta. L 18–41. Apr. 2. Kupreanof Strait, south side, 2 mi. NW of Bare Island. In 13–15 fm.
Sta. L 20–41. Apr. 5. Raspberry Strait, across from Port Wakefield. In 2–30 fm.
Canoe Bay or Pavlof Bay. Sept., 1940.
Canoe Bay. Sept. 23, 1940.
Dolgai Harbor. Oct. 6, 1940. Low tide, off water works.
Sand Point. Oct. 25, 1940.
Mist Harbor. Oct. 27, 1940.
Pavlof Bay. Nov., 1940.
Mitrofania Bay.
Lazy Bay, off Alitak Bay. Nov. 12, 1940. Digging in sand and gravel at low tide.
Head of Lazy Bay. Jan. 22, 1941.
Seldovia. Mar. 18, 1941.

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The Question of Avian Introductions in Hawaii

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A UNIQUE FACT about the avifauna of the Hawaiian Islands is that seldom is a native bird seen in the urban areas. However, birds of a few species are abundant in the same areas; these birds are exotics introduced for various "good" reasons. The importation of birds has not been limited to forms that would be restricted to the habitat provided by the lower coastal areas which, with few exceptions, are also the urban sections. Hawaiian mountains and forests have many established foreign birds, and native birds in most regions are relatively rare.

In perhaps no other similarly circumscribed area in the world have as many exotic species been introduced successfully. Bryan (1944: 84) records 232 species for Hawaii; of these, 94 are exotics of which 53 are probably established and the remainder of unknown status. He notes that so little field work has been done that it is impossible to know the fate of many of the exotics. In addition, it is worthy of mention that in many instances no one even knew at the time what was being liberated here; the records of the territorial agency concerned often simply state "500 small birds," or list little-used colloquial names, or those used by dealers in birds. Furthermore, the home locale of the bird is not generally recorded; the port of embarkation for Hawaii is the only information we have that sheds light on the native region of the species, and such information is of little use. In those instances in which closely related species, and subspecies of one species, have been imported (as in doves), and where interbreeding may have occurred, we probably never will be able to unravel the situation enough to determine the breeding stock first liberated. Had all pertinent information been recorded, the ornithologist now and in the future might have been able to note the adaptive changes in the structure, food habits, and behavior of the birds occasioned by the environmental conditions in Hawaii. This knowledge would in turn aid us in evaluating past and possible future importations, and it would have been of interest and value to ornithologists all over the world.

Importations in the past have been for the most part a result of the activities of a few organizations and several individuals. At least one group in Hawaii was organized primarily for the purpose of introducing and establishing songbirds in these islands. There is no question that these groups and individuals believed they were "improving" the natural attractiveness of the islands. One may question, however, the benefits derived from these activities. In addition to the species purposely liberated, several kinds of birds have first come in as cage birds and later escaped. Among these are the Chinese Thrush (*Trochalopterum canorum*), which escaped in Honolulu during a large fire in 1900, the Strawberry Finch (*Amandava amandava*), and the House Finch, or Linnet (*Carpodacus mexicanus*). These are, of course, inadvertent liberations, but the effects are often the same as in purposeful liberations. Care must be exercised in permitting the entry of cage birds.

Much of the fervor for exotic birds is based upon the assumption that Hawaii is an "avian desert." In part this is true today if one considers only the native species and the lower, urbanized parts of the islands. It is not and never has been true of the higher, forested areas where some of the native Hawaiian species still

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exist in considerable numbers. Furthermore, it is probable that the importation of foreign species has contributed not a little to this apparent paucity of the avifauna by driving the native species farther into the mountains and perhaps by aiding materially in the extinction of some species.

This desire to have birds in the Hawaiian Islands has gone beyond the concept of filling a vacancy in the lowlands and has proceeded to extremes as shown by the following statements of a former official of the Territorial Board of Agriculture and Forestry in the *Paradise of the Pacific* (49 (1): 28, 30, 1937): "We want to fill the Islands with birds of all desirable species that will survive here" and, "Hawaii can be transformed into a universal aviary, a bird haven where every known species of birds, not injurious to Hawaii, will propagate and thrive under the conditions of their natural habitats." It is true that these statements are qualified by the terms "desirable" and "not injurious," but there is no positive way to predict the "injurious" phases of an exotic bird's behavior in its new home. Yet, this same official indicates quite correctly (*op. cit.*, p. 6) that what is desirable at one time may not be desirable at a later date by saying in regard to species wanted that ". . . things are different in the 1930's than in the 1850's." He might also have said that birds desirable to one economic group are not so to another, and that birds esthetically desirable may not be so desirable economically, and vice versa. No mention was made of the desire on the part of some to try to preserve and increase the populations of native birds, many of which are peculiar to these islands and, if lost here, would be extinct.

The movement for more and more birds has also been supported by unfounded generalized statements (*Aviculture*, 3:333–334, 1931; and 4:70–71, 1932) that exotic birds are *not* detrimental to the native species in Hawaii. To my knowledge no comprehensive study has ever been made of the interaction of an exotic and a native bird in Hawaii!

Whether the past introductions of birds were beneficial or detrimental is beside the point; we must now accept the successful exotics as a part of the avifauna; but at the same time extreme care should be exercised in the importation of additional species. It is not enough that a bird is desired by a group or an individual, and that it appears innocuous in its native ecological niche. No one can foretell definitely and accurately the overall activities of a species transplanted to a new region, nor can anyone foresee all the multitudinous implications of such transplanting. However, as McAtee (1925: 160) states ". . . when we consider animals and plants not strictly domesticated, successful introductions have almost invariably had regrettable consequences."

Birds that are omnivorous in their original home need special investigation before being transplanted. Such birds are often opportunists, as regards food, and thus feed on the most abundant and easily obtained food item. This item may be beneficial insects, a particular farm crop, or some other article more "valuable" than the bird itself, even to those who had clamored for its importation. A species predominantly insectivorous in its native region may for various reasons change its food habits so that its major item of food in its new home is grain, or perhaps fruit. Or, if it fed almost exclusively on a single insect or group of insects in its native home, it may find that this insect or group is not as easily obtained as some other insect; it may then feed on the most abundant food supply. Consequently, such a bird, when imported for insect control, particularly of a specific insect, may be a failure. Yet, it may become firmly rooted here. Perhaps the search starts again, and another species is tried, and another, with varying results, until we have a polyglot fauna such as is found in Hawaii at the present time.

The breeding potential, or the ability of a bird to reproduce successfully, is another important consideration when a bird is moved into a new region. We need not concern ourselves with those which cannot breed successfully. A

species transported to a more equable climate may show an increased length of breeding season; it may nest several times in a year and may be more successful in raising its young. The Kentucky Cardinal (*Richmondena cardinalis*) is a good example; in the Territory of Hawaii this bird breeds throughout the year, and a single pair has been known to rear three broods in a year, compared to one or sometimes two broods in continental United States. Its numbers are increasing remarkably. Other species show similar trends. Not only is the longer season important in raising the breeding potential. In their native countries most of the species are partly limited by the amount of food available and by the number of species using them as prey. With an abundant food supply for many different species, as in Hawaii, and the possibility of birds adapting their food habits to the more easily obtained foods, there is a distinct probability of enormous increases in the populations of certain species. This may not be desirable.

In the islands there is no avian predator to help control the populations; the only hawk (*Buteo solitarius*), which does not feed on birds except occasionally, is limited to the island of Hawaii, and is present in such small numbers that it is ecologically unimportant. The Short-eared Owl (*Asio flammeus sandwichensis*) is a possible predator. It is thought to feed primarily on mice, but its food habits are largely unknown. The only other vertebrate animal species available to prey on young or adult birds or their eggs are: feral cats, dogs and hogs, the native rat (*Rattus hawaiiensis*), which is not numerous, several exotic species of the family of Old World mice and rats which are cosmopolitan, and the many mongooses (*Herpestes*) which have to a great extent failed to accomplish the purpose for which they were imported, that is, to keep the rat populations at a minimal level. There are those who maintain the mongoose is the major factor keeping the rats under control, but field observations indicate that large numbers of rats and of mongooses are present in the same areas. The tendency of rats to spend more time in trees may have been occasioned by the activities of the mongoose. Because of this tendency to live in trees, the rats are now more of a menace to the tree-nesting birds; formerly their predatory activities were more or less restricted to ground-nesting birds. Aside from this, the mongoose is probably the most important control on ground-nesting birds in Hawaii. This theory is attacked by those who have examined stomachs of the animal on the grounds that they do not usually find feathers or remains of eggs in the stomachs. A study of the feeding habits of the mongoose has shown the inadequacy of such an argument because the mongoose never eats the shell of an egg, and in eating birds it makes only one or two small openings in the carcass, works through these, and leaves the outside of the bird ruffled but practically intact. Considering this method of feeding, one could not expect to encounter numerous feathers in the stomach of the mongoose. The workers who studied the stomach contents do not mention in their unpublished studies the fate of the ground-nesting birds of Jamaica when the mongoose was introduced, but they do cite the success of the mongooses in helping to control the rats there.

Whether or not the mongoose fulfilled the promises of its importers, we now have rats and mongooses in abundance on the main islands, except on Kauai, Niihau, and Lanai, where the mongoose was never liberated. Both animals exert a depressing effect on the population of birds.

Avian diseases also aid in controlling numbers of birds, but we know practically nothing of these in Hawaii. Avian malaria has been found in the exotic Red-billed Leiothrix (*Leiothrix lutea lutea*) in Hawaii (Fisher and Baldwin, 1947: 51). We cannot say definitely that this disease was first introduced with imported birds, but the evidence seems to point that way; nor can we say definitely that the native birds have been adversely affected by malaria. For most animals imported into the Territory a

period of quarantine is imposed to give some modicum of insurance against the introduction of diseases communicable to animals and man. No such provisions are present for avian importations as evidenced by the recent arrival (March, 1947) and almost immediate release of a number of Mexican Buntings. Holding wild birds in custody might result in the loss of some individuals, but it would be preferable to subjecting native birds and already established exotic birds to the danger of unknown diseases. At the very least, representative fecal and blood smears should be made, and a few birds of each shipment should be sacrificed for autopsy and pathological study. It seems insufficent to allow the entry of birds on the basis of a clean bill of health as testified by the importer or by a veterinarian in the country of export.

Except in one or two areas in these islands, the weather is never a major factor in decreasing already established populations. In other parts of the world, inclement winter weather conditions may act as a severe check, especially on small birds, by increasing greatly the mortality rates.

The interaction of the exotics and the native flora and fauna is a matter of concern and is unpredictable. Not only this interaction but also that between the various exotic species established here should be investigated. One example may emphasize the significance of the interlocking activities of exotics in Hawaii. *Lantana Camara* was brought in as an ornamental plant. Mynahs (*Acridotheres tristis*) were imported especially to aid in controlling the army worm (*Laphygma exempta*). Various species of doves were established for sundry reasons. *Lantana* in its native Mexico is not a pest and mynahs and doves are not undesirable in their original homes. The individual importations of these three organisms seemed harmless. Each importation was made for specific reasons, and each might not have been so detrimental had not the others also occurred. This is what happened in Hawaii. The mynah fed on army worms as was expected, but it also began to feed on lantana berries, so much so that correlative fluctuations in the abundance of berries and mynahs were observed. The army worm is now seemingly a secondary food item, subject to selection on the basis of relative abundance. Although doves may feed on lantana berries to only a limited extent, it is enough to have been a factor in spreading the seeds. The seeds pass through the digestive tract of birds and are viable. Experimentation with various other seeds has shown that viability is often actually increased by the passage of a seed through a bird. This might be true with lantana. It is known that other factors were of importance in spreading lantana, but in this review we are interested in birds primarily, and they did have a part in the dissemination of the seeds. As a result of all factors lantana spread widely and became one of the most noxious of plants in the Territory. To curb the spread of lantana certain insects were brought in. They were successful in part, but it is reported that in areas where the lantana was eradicated or greatly reduced another undesirable exotic plant took over.

The result of establishing the mynah in Hawaii is similar to that obtained in Fiji, as reported by Stoner (1923: 328–330). In Fiji the mynah was also imported to control injurious insects, but, as in Hawaii, it soon began eating more easily obtained foods, and, in addition, was harmful to the native birds. Therefore, by 1923, the mynah was considered a pest and was no longer protected. One important aspect of Stoner's observation was that the mynah in the Fijian area was heavily parasitized. It is also replete with parasites in Hawaii. Thus, there is the possibility that species already present in a region may be infected when the mynah is transplanted there, subject, of course, to the degree of host specificity of the parasites. Moreover, on the offshore bird islands of Oahu the author and his students have found the mynah pecking open the eggs of Sooty and Noddy Terns.

The person responsible for introduction of the mynah is also credited with the importation of the Rice-bird (*Munia punctulata*), which is now numerous on all the islands. It became a pest in the rice fields, but this is a minor discredit now because of the decline of rice as an important crop in the islands and not because of any foresight at the time it was introduced.

The Kentucky Cardinal, imported because of its brilliant color and song, is now considered detrimental by some fruit growers. This situation, in contrast to the usual situation in continental United States, is probably brought about by the relatively large populations of cardinals, discussed previously, and the relatively small acreages devoted to fruits in the Territory. It simply means that in Hawaii more birds are present per unit of fruit grown. Consequently, the percentage of damaged fruit is greater. One cannot, however, condemn the bird entirely on this evidence, for it may aid in controlling certain insects.

The European Skylark (*Alauda arvensis*) was considered by many to be a pest when it became established in New Zealand. Although this bird is present in the Hawaiian Islands, it seems unlikely that it will become a major nuisance as long as it continues to frequent open grassland; on most of the islands the area of suitable habitat is relatively small and is not in juxtaposition to truck farms. However, on the island of Kauai this species is regarded as a scourge to newly planted lettuce in the truck farming country. If the skylark should become more and more reliant on seeds of cultivated plants, or if the truck farms should expand to include part of the range of the skylark, or even extend to the edge of the range, it seems likely that the species will be on the pest list.

The Red-billed Leiothrix was established for its pleasing song. As mentioned previously, it has been found to be a carrier of avian malaria. It is *now* considered undesirable by various fruit and vegetable farmers.

The Linnet (*Carpodacus mexicanus*) has already acquired the Hawaiian name of "Ainikana" (papaya eater) because of its proclivity to eat papaya, a staple fruit of the islands. At present, however, the papayas damaged are usually those considered overripe for human consumption.

The ecological balance of the various organisms in an area, which is established by natural processes over long periods of time, has been so altered in Hawaii that years will be necessary for any sort of equilibrium to be reached, and it will never be attained if indiscriminate introductions do not cease. Most of the importations have been of this category. Little care or thought has been given to the complexities of an organism's behavior, other than that it is esthetically pleasing, or that it might destroy a certain plant or animal as part of its activity.

We in Hawaii must change our concepts regarding importations. We must not accept birds on the simple basis that someone wants them and that no objection has been raised. We should express our concern about continued, unstudied introductions, especially in view of past experiences here and elsewhere. The responsibility for proving the "need" for a certain species should lie with the importer, and he should bear the burden of a complete investigation by competent authorities over a period of time. This would prevent many introductions and would of course make all importations difficult. I feel that our general attitude should be that we want no more exotics.

However, if importations for transplanting and for cage purposes are to continue, a definite program of control should be set up. Such a program might include the following points:

1. The first step toward importation should be a study of the various aspects of the species in its native habitat. If the species has been established in other areas foreign to it, the effects of introduction there should be noted. In many instances much information could be gained simply by a survey of the literature on the species involved.

2. As soon as a shipment arrives, representative specimens of both sexes should be prepared as study skins for use in positive identification and for future reference.
3. For all birds imported, there should be recorded: (*a*) The native home of the birds. This should be specific, listing country, province or district, and nearest town, and the date on which the birds were first removed from this area. If, as is true quite frequently with cage birds, the birds have been raised in a country other than their native home, this fact should be recorded. (*b*) The number of males and females should be noted, if it is possible to sex the birds on the basis of external characters.
4. Immediately after arrival in the Territory, all birds in any one shipment should be placed in quarantine, as are other animals, for a certain period of time, to provide some protection against introducing parasites and disease.
5. At the end of the period of quarantine a general pathological examination should be performed on a sample of the importation, and fecal and blood smears made.
6. At the time of release to the importer for liberation, the exact locality at which the birds are to be freed should be put on permanent record. The date of liberation, the valley, ridge or town, and the island of release should be noted.
7. In some cases it might be best at first to limit the liberation of a species to one island in the archipelago. The effects of the species on the plants and animals of that island and its own success in surviving and reproducing could be studied for a few years. Later, if desired, it could be moved to other islands. This procedure might save some of the islands from the effects of a new pest species.

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NOTES

Observations on Parasites of Domestic Animals in Micronesia

As a part of the Micronesian Expedition of the University of Hawaii in the summer of 1946, observations were made by the writer on parasitic diseases of man and of some of the important economic animals on the islands of Ponape and Guam, and on Moen (Truk archipelago). Brief reports have already been published by the writer on observations of parasites of man (*Jour. Parasitol.* 32: 12–13, 1946) and on murine leptospirosis (*Science* 105: 236, 1947). The present note summarizes some of the observations made on parasites taken mostly from domestic animals.

Parasites of Cattle. Many skin lesions associated with extensive tick infestation were noted on 12 cows examined in the Net and U districts of Ponape. The ticks have been identified as *Boophilus annulatus australis* (Fuller), carriers of bovine piroplasmosis or "Texas fever." Reports (*Civil Affairs Handbook, Office Chief Naval Operations U. S. Navy, OPNAV* P22–5, p. 129. 1944) indicate that on Ponape many cattle have in the past died of this disease. The examination of the feces of six of the above-mentioned cows failed to reveal presence of liver fluke eggs. A verbal report from Mr. Oliver Nampei, resident of the island, indicated that liver flukes had been noted in cattle on Ponape. A search by the writer in several fresh-water streams in the Net and U districts for lymnaeid snails, known carriers of liver flukes, yielded negative findings.

The examination of one bull near Agaña, Guam, revealed a moderate infestation of ticks identified as *Boophilus annulatus australis* (Fuller) and *Amblyomma cyprium* Neumann. Liver flukes, *Fasciola hepatica* Linn., are known to occur in cattle on Guam. The identification was made by the writer in 1940 from specimens submitted by Mr. A. I. Cruz of the Guam Department of Agriculture. The intermediate host for these flukes on Guam is believed to be the fresh-water snails *Fossaria ollula* (Gould), which were collected by the writer in a swampy area near Agaña. This snail has been experimentally proved to be a suitable carrier for *F. hepatica* (*Hawaii Agr. Expt. Sta. Rpt.* 1946: 99, 1947).

Parasites of Swine. On the island of Ponape, the post-mortem examination of a pig, approximately 1½ years old, revealed several immature kidney worms, *Stephanurus dentatus* Diesing, within nodules in the mesenteric and perirenal fat. The liver of the pig showed considerable discoloration and fibrosis, conditions commonly seen in kidney-worm infection caused by the young migrating worms. The large intestine of the animal also showed a moderate infection of nodular worms, *Oesophagostomum dentatum* (Rudolphi).

On the island of Guam, two pigs, butchered at the slaughterhouse of the U. S. Commercial Company, showed infections of lungworms, *Metastrongylus elongatus* (Dujardin), and nodular worms, *Oesophagostomum dentatum* (Rudolphi). In addition, one of the pigs harbored a moderate infection of kidney worms, *Stephanurus dentatus* Diesing. The liver of the pig showed many white spots and young kidney worms. The butcher at the slaughterhouse stated that in his estimation about 50 per cent of the hogs slaughtered there showed similar kidney-worm lesions.

The limited observations made on Guam and Ponape indicate that kidney-worm infection in pigs may be widespread in Micronesia. Kidney worms produce serious damage to pigs, and therefore represent a group of parasites of considerable economic interest. Since the natives depend on swine as one of the major sources of animal protein, it is desirable that proper measures be taken to control this parasite. A method which has been suggested by the U. S. Department of Agriculture (*Farmers Bul.* 1787) for kidney-worm control in the southern states consists in raising pigs on pastures surrounded by a dry, bare area which allows the action of the sun to destroy the developing eggs and larvae of the parasite. This method does not appear adequate for many areas of Micronesia where rainfall is common and the sky is cloudy or overcast more than three-fourths of the time. It appears

that the pasture rotation system might prove more suitable for Micronesia. In addition, young pigs should be raised on sheltered, dry or concrete floors and after weaning kept away from older hogs on places that have not been used by older hogs. To prevent the spread or increase in the incidence of the infection, it is important that infected hogs are not shipped to new areas. Piglets to be shipped to new localities should come from litters that have been raised on concrete floors or dry areas.

Parasites of Chickens. On the island of Ponape the following parasites were found in four adult chickens: (1) proventricular roundworms, *Tetrameres* sp.; (2) cecal worms, *Heterakis* spp. (probably *H. gallinae* (Gmelin) and *H. lingnanensis* Li); (3) tapeworms, *Amoebotaenia* sp. (probably *A. sphenoides* (Railliet)) and *Raillietina* sp. (probably *R. echinobothrida* (Megnin)); (4) lice, *Lipeurus caponis* (Linn.), *Menopon gallinae* (Linn.), and *Oxylipeurus angularis* Peters; (5) mites, *Pterolichus obtusus* Robin and *Megninia cubitalis* (Megnin). The chicken mite, *M. cubitalis*, was also collected from several chickens on the island of Guam.

Parasites of Dogs. Post-mortem examination was made on one dog on Ponape. The small intestine of this animal showed extensive in flammation associated with a large number o hookworms, *Ancylostoma caninum* Ercolani. A few tapeworms, identified as *Dipylidium* sp. were also found in the small intestine. The do also showed a light infestation of fleas, *Ctenocephalides felis* (Bouché).

Parasites of Rats. Several mites, *Laelaps echidninum* Berlese, were collected from a few rats trapped on Ponape. No fleas were found on 18 rats which were examined. Of the kidneys of 22 rats trapped on Moen and 18 rats from Ponape, 3 and 2, respectively, showed, in stained sections, presence of leptospirae morphologically identical to those of *Leptospira icterohaemorrhagiae* (Inada and Ido).

The writer wishes to acknowledge the assistance of individuals who identified some of the parasites reported above, as follows: ticks from cattle, C. N. Smith; roundworms and tapeworms of chickens, E. E. Wehr; lice from chickens, C. F. W. Muesebeck and E. W. Stafford; mites from chickens, E. W. Baker; fleas from a dog and mites from rodents, C. E. Pemberton; lymnaeid snails from Guam, H. A. Rehder.—*Joseph E. Alicata, University of Hawaii Agricultural Experiment Station, Honolulu, Hawaii.*

Laysan Albatross Nesting on Moku Manu Islet, off Oahu, T. H.

ON FEBRUARY 23, 1947, a young albatross was found among the Red-footed Boobies (*Sula s. rubripes*) and Sooty Terns (*Sterna f. oahuensis*) nesting on Moku Manu, which is approximately three-fourths of a mile off Mokapu Peninsula on the northeastern side of Oahu. At this time the bird was covered with down and identification was impossible. By May 10 the young bird had assumed the characteristics of a young *Diomedea immutabilis*, and on July 12, when the picture was made, there could be little doubt of its identity. On July 29 the bird could not be found. Presumably it had left the island, as do the young at this season on other islands. This is the first recorded instance of the Laysan Albatross nesting in the eastern end of the Hawaiian archipelago. Its most easterly nesting ground has heretofore been thought to be the Bird Islands, east of Necker Island in the Hawaiian Islands and some 400 miles to the northwest of Moku Manu.

Although successive trips were made to the nest site on March 20, April 19, May 10, 17, 31, June 14, July 12 and 29, 1947, adult albatrosses were never observed on the island. A single adult *Diomedea immutabilis* was observed May 31 resting on the water just outside the reef at Kaneohe Bay, some 3 miles from Moku Manu. On June 14 another adult was observed flying above Mokulua Islet, off Lanikai, Oahu. These are the first inshore records of the Laysan Albatross in the waters surrounding the eastern end of the Hawaiian chain.—*Harvey I. Fisher, Department of Zoology and Entomology, University of Hawaii, Honolulu, Hawaii.*

Preliminary Note on the Oceanographic Program of the Hawaii Marine Laboratory

DR. HARALD U. SVERDRUP, director of the Scripps Institution of Oceanography of the University of California, was invited to come to the University of Hawaii for the period November 14 to 22 to advise upon a program of oceanographic investigation to be undertaken at the new Hawaii Marine Laboratory. Plans for the erection of the laboratory building are now completed and the physical plant should be ready for use during the latter part of 1948. Details on the laboratory and its attendant docks, marine railway, outdoor tidal ponds, and aquarium tanks together with the operating policies will appear later. The entire physical plant and the endowment for its operation have been donated to the University of Hawaii by Edwin W. Pauley and four associates, Harold Pauley, Allen Chase, Poncet Davis, and Samuel B. Mosher, co-owners of the small island, Moku-O-Loe, in Kaneohe Bay, Oahu, on which the laboratory will be situated. The University of California will cooperate with the University of Hawaii in many of the activities of the laboratory, which will be equipped for biological as well as oceanographic research.

Plans outlined for oceanographic research at the laboratory emphasize those aspects of oceanography peculiar to this sub-tropical region of the central Pacific. Broadly speaking, the oceanographic program may be called a study of the ecology of the near-shore and off-shore waters around the islands of Hawaii, and the study is readily divided into three phases: (1) Ecology of the near-shore waters, i.e., primarily the waters inside the reefs; (2) ecology of the transition region beyond the reef; (3) ecology of the oceanic waters.

These subdivisions are established for the following reasons: The very near-shore waters have their endemic faunal and floral populations but these waters are also the nursery grounds for much of the food of pelagic fishes. Within many of the near-shore areas there is a rapid exchange of water with the outside, and it appears possible that a considerable amount of the organic matter present off the reef area is produced on and inside the reef. The region directly beyond the reef is another ecological subdivision, distinct in character from the oceanic water at greater distances from the shore. How far the near-shore effects reach is unknown. Similarly, it is not known if the off-shore waters are uniform or if variable conditions related to external influences such as variable winds or upwelling are commonly encountered.

Kaneohe Bay is well suited for an intensive study of near-shore waters. The bay inside the reef has an area of about 15 square miles, and is connected with the outside waters by several channels. This study will involve (1) a program of sounding for the purpose of constructing a chart of the bottom topography, (2) the collection of bottom samples for the preparation of a chart showing the character of the bottom with particular reference to its biological significance, (3) the recording of tidal observations in order to reduce observed depths to a common level and possibly to give some indication of the transport of water across the reef, (4) a study of the exchange of water between the bay and the open sea, (5) a study of the temperature distribution for the purpose of relating possible variations to the pattern of circulation and to the effect of radiation, (6) a study of transparency by regular observations, (7) a chemical investigation of salinity, oxygen, phosphates, nitrates, and, intermittently, calcium, alkalinity, *p*H, and other characteristics, all of

which will be related to the pattern of circulation and used in connection with a study of the productivity of the region. The biological work accompanying this physical and chemical investigation will involve, initially, a great deal of systematic work which will be accompanied by studies of the production of organic matter and the relation of the organisms to their physical, chemical, and biological environment.

The transition zone will be examined by extending part of the work outlined for Kaneohe Bay to the waters just beyond the bay. Additional investigation of this area will include bathythermograph observations.

To provide a basis for planning off-shore oceanographic work, the Scripps Institution will examine and discuss the results of numerous bathythermograph observations which have been made around the Hawaiian Islands. The seasonal and geographical variations in the character of the mixed top layer will be given special consideration. The currents around the islands will be analyzed as far as possible. Such a study may disclose certain critical localities which should receive special attention, and the oceanic work may then be planned to take such features into account.

It is believed that for some time the oceanic work will be strictly exploratory. Routine observations, including temperature, salinity, minor constituents, transparency, and biological features, will be made of the character of the surface layer and of the waters at or directly below the thermocline.

News Notes

DURING HIS VISIT to Honolulu to advise the University of Hawaii on establishing the Hawaii Marine Laboratory, Dr. Harald U. Sverdrup, director of the Scripps Institution of Oceanography, spoke on "Wind, Sea, and Swell" at a public meeting, sponsored by the University and the Hawaii Chapter of the Society of the Sigma Xi. He also conducted a symposium for interested scientists on the subject "Ocean Currents."

ABOARD THE auxiliary schooner "Albatross," the Swedish Deep-Sea Oceanographic Expedition visited Honolulu from November 28 to December 12, 1947. The Expedition, under the leadership of Dr. Hans Pettersson, possesses equipment and personnel for making physical, chemical, geological, and some biological observations during its world tour. It is following, in part, the course of the "Challenger" Expedition of 1873–76, and, in the Pacific, has already made stops at the Galapagos Islands, Tahiti, and Hawaii. From Honolulu the Expedition will go to Kusaie and Ponape, and from there southward to the Netherlands East Indies. While in Honolulu the scientists and the crew of the "Albatross" were entertained by local scientists and by Scandinavian members of the community.

DR. THOMAS A. JAGGAR'S monumental work, *The Origin and Development of Craters,* has been released as Memoir 21 of the Geological Society of America. This book records, as the author states, his "experience in measuring physical processes at Hawaiian craters and in mapping changes at the craters themselves," and uses this experience as "a reasonable theme whereon to base a new approach to field volcanology."

JAGGAR, THOMAS A. *The Origin and Development of Craters.* Geological Society of America, Memoir 21. xvii + 508 p., 87 pl., 14 fig. Waverly Press, Inc., Baltimore, 1947.